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BERTHING AND UTILITIES REQUIREMENTS FORECASTING (BURF) PROGRAM --ETC(U)
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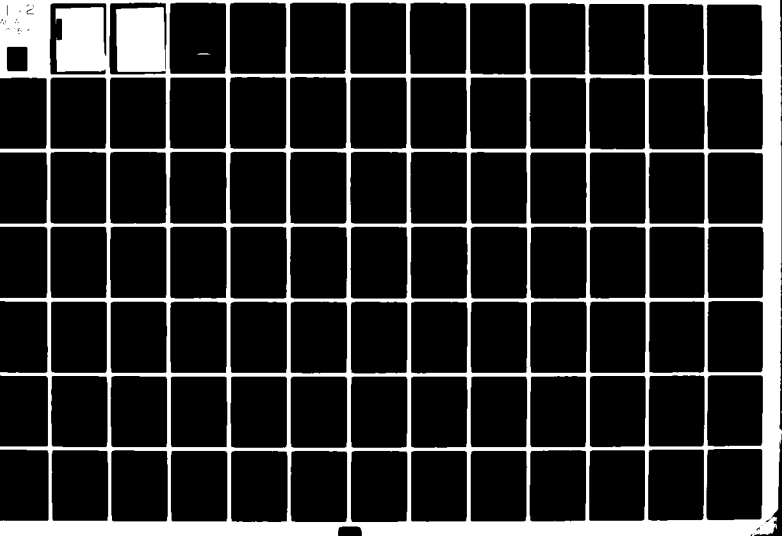

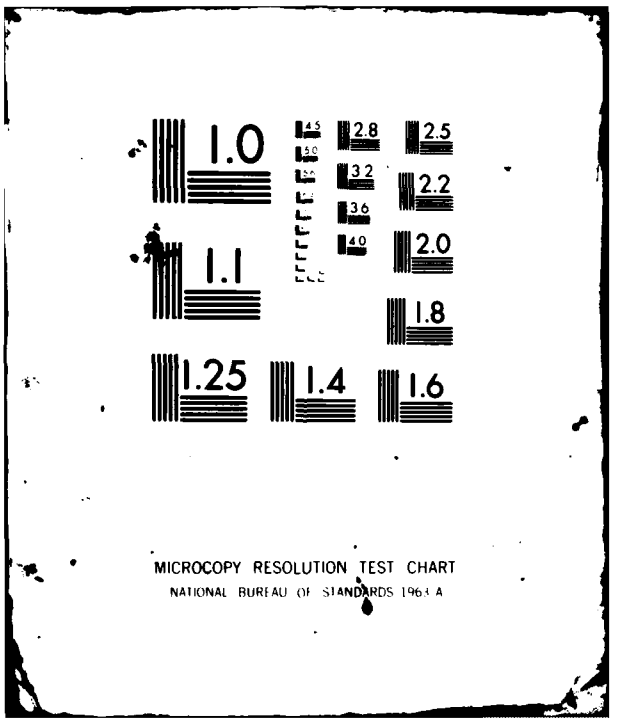
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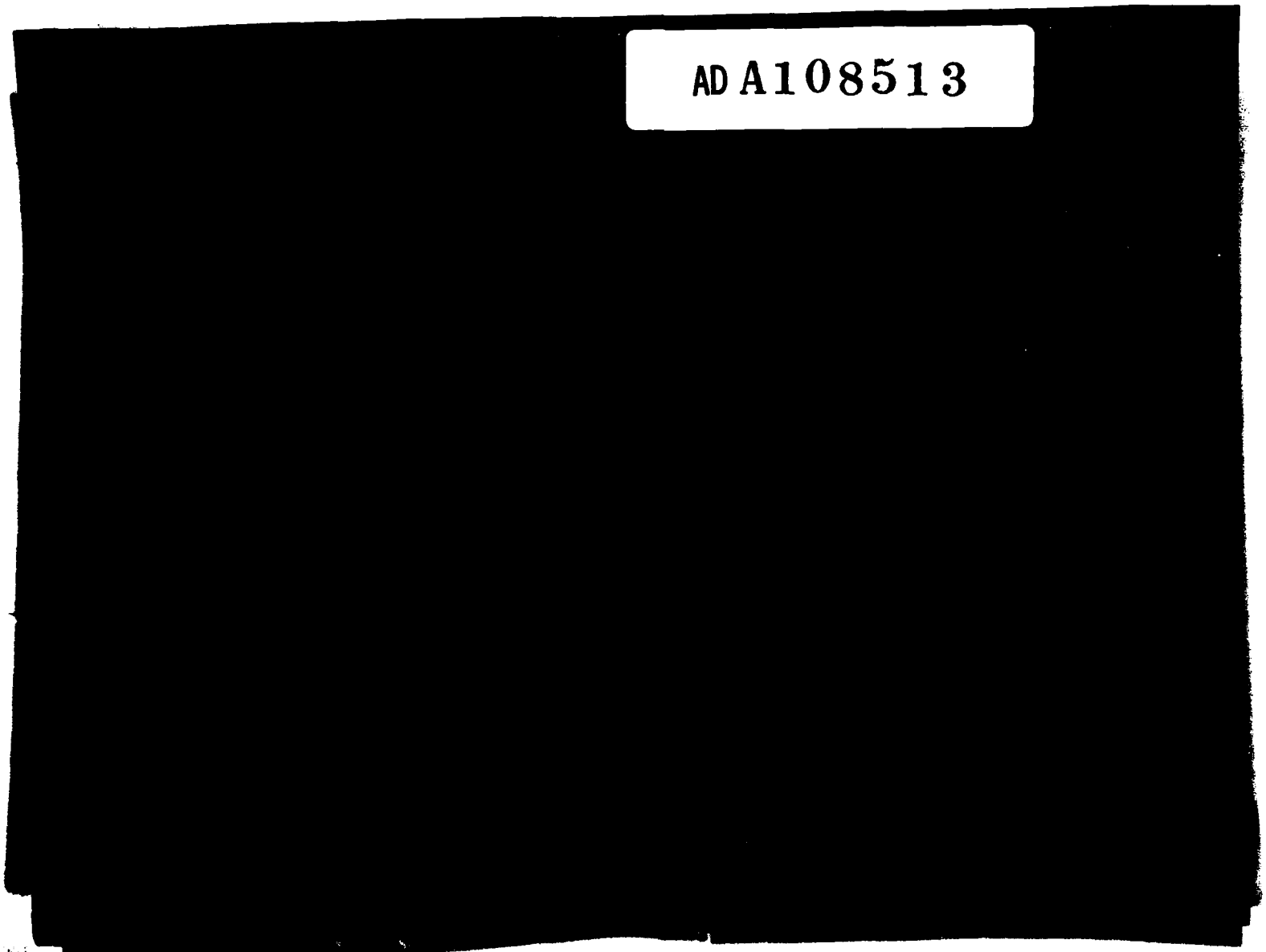

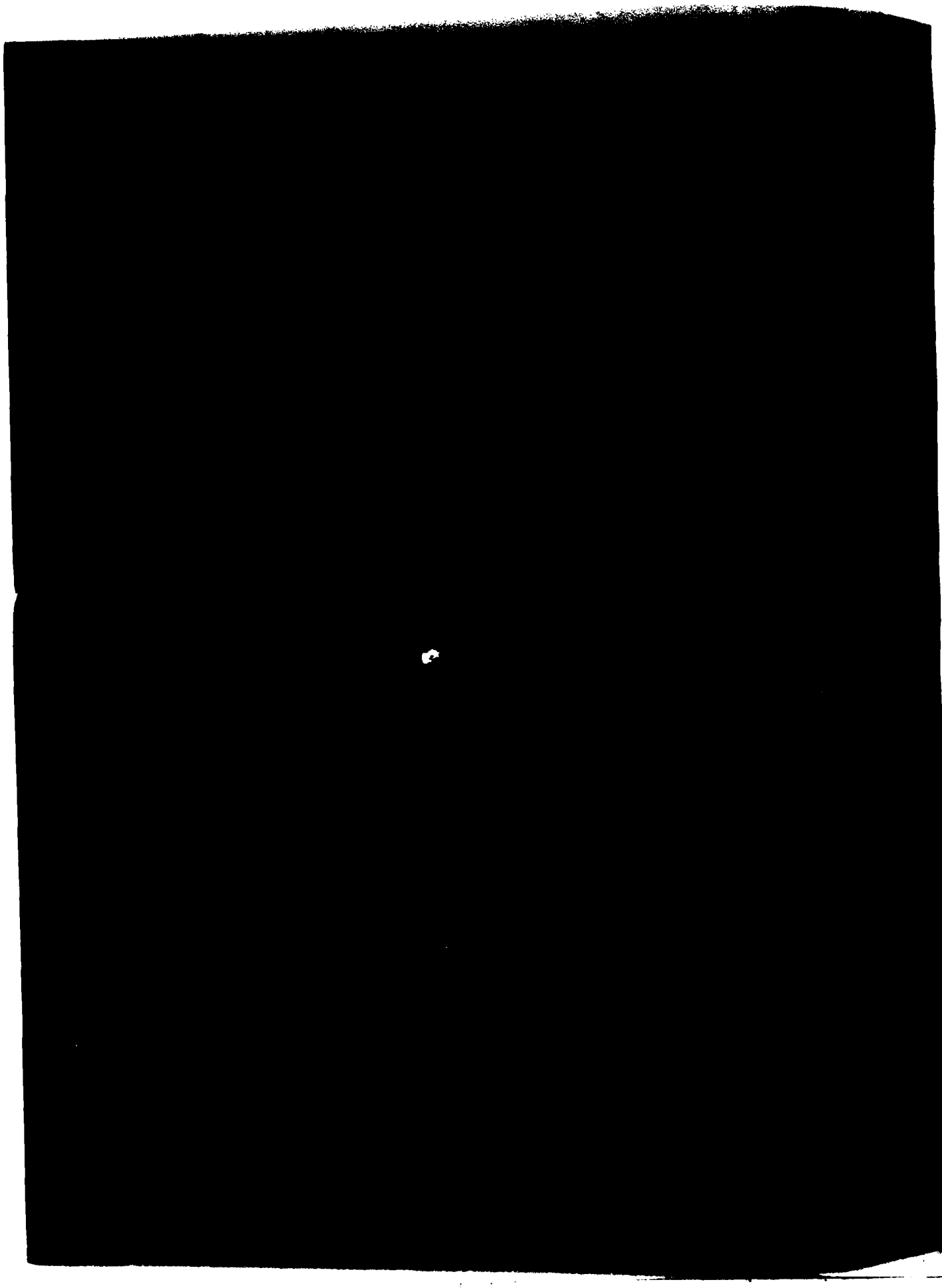

DEPARTMENT OF THE NAVY

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Bethesda, Md. 20034

BERTHING AND UTILITIES REQUIREMENTS FORECASTING (BURF) PROGRAM OF THE NAVSHIPS LONG RANGE WORKLOAD PLANNING SYSTEM (LRPS)

by

Raymond E. Melton

and

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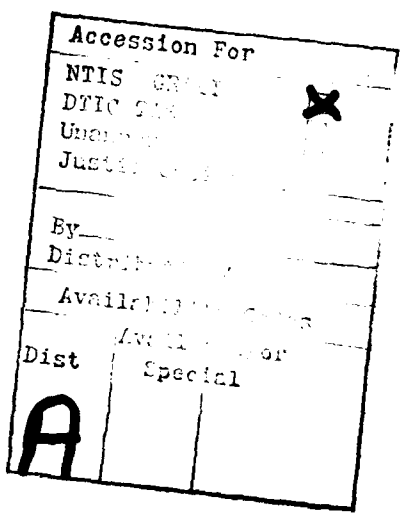

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February 1973

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ABSTRACT

The Berthing and Utilites Requirements Forecasting (BURF) Program is a management tool designed to determine the berthing requirements for the naval shipyards over a long-range period. The berthing utilities considered by the program are linear space (ft), electric current (ac at 450 volts), fresh and salt water (gpm), and steam power (lb/hr). Given the ships to be berthed in a shipyard for any one day, the system will assign selected ships to berths and forecast the resulting utilities requirements at that yard for that day. By choosing appropriate peak days over the long-range period, an overall forecast for a yard can be produced.

ADMINSTRATIVE INFORMATION

This effort has been carried out by the Navy Logistics Analysis Group, Code 1863, of the Operations Research Division. It has been sponsored by NAVSHIPS, Code 70T, NAVSHIPS Work Request WR-2-5081.

1. INTRODUCTION

1.1 BACKGROUND

The Long Range Shipyard Workload Planning System (LRPS)* is a linked series of computer programs which provides a realistic simulation of resource requirements for the projected naval ship workload. It provides a means to analyze the nation's shipbuilding and ship-repair capability and to identify problem areas.

The task of the main program (SCHED) is to make assignments of the ships available for maintenance to naval and private shipyards. These ship/yard assignments are restricted by each ship's homeport proximity and the ship workload mix. Naval shipyard resources are scheduled for half-year intervals to take into account each ship's maintenance availabilities. The product of SCHED is a ship/yard workload assignment file reflecting these restrictions. This file is the major input to the other LRPS programs.

In the LRPS process of assigning a ship to a yard and to a drydock within the yard, a need arose to forecast the utilities required by the ship workload at the shipyard berths. A Berthing and Utilities Requirements Forecasting Program (BURF) was designed to meet this need. The utilities at the berths considered by BURF are space (linear ft), electric current (ac at 450 volts), fresh and salt water (gpm), and steam power (lb/hr). BURF projects these required utilities during peak time periods and forecasts their excesses and/or deficiencies with respect to present year conditions.

1.2 RELATION OF BURF TO LRPS

The subsystems of LRPS whose outputs are necessary to the Berthing and Utilities Requirements Forecasting System are described briefly below. The relationship of the BURF program to the major LRPS subsystems is shown in Figure 1.

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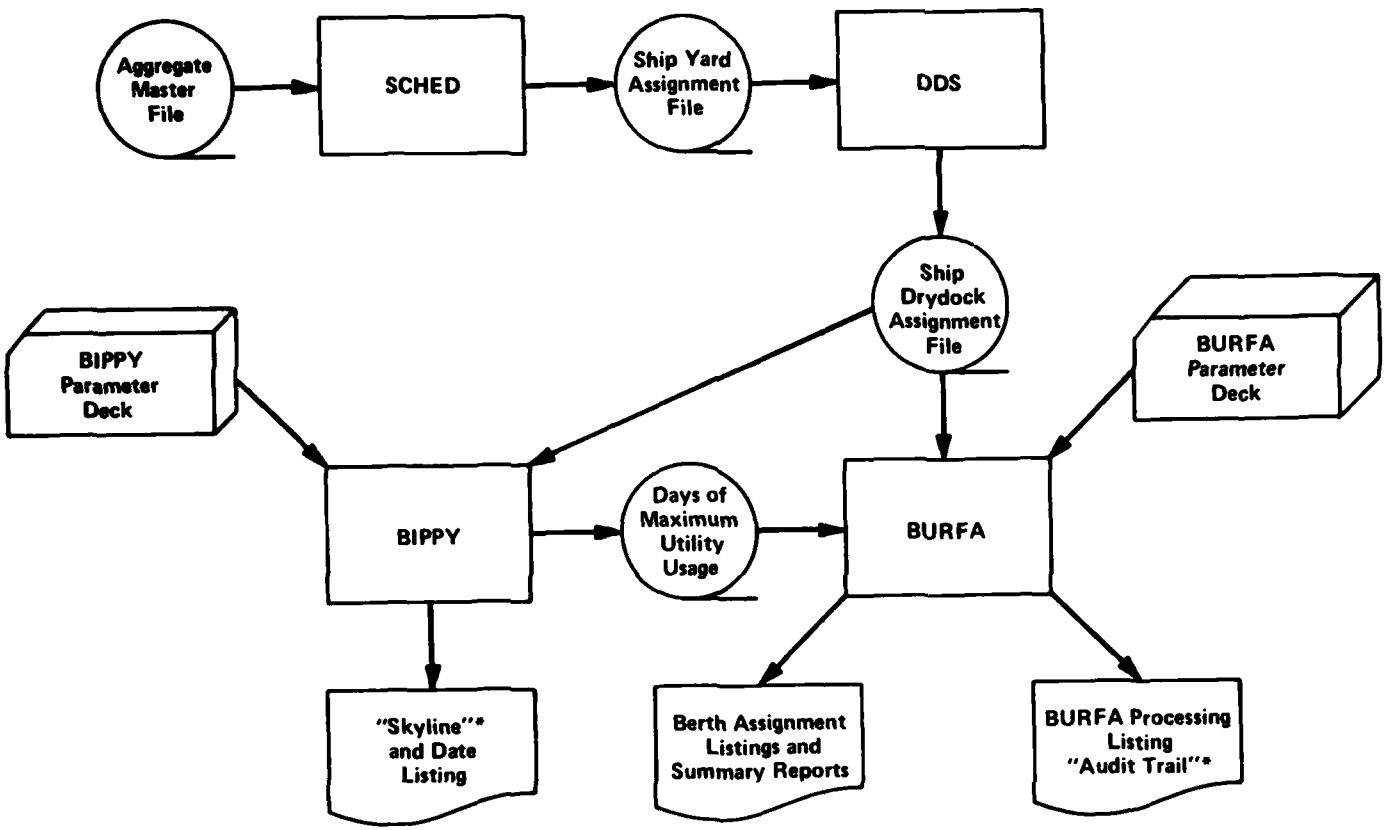
* Informally documented in NSRDC, AML Technical Note, AML-1-1969, January 1969, By Eric Jorgensen



*Note: The term "Skyline" is explained in Section 4.1; the term "Audit Trail" is explained in Section 5.2.

Figure 1 – Relationship of BURF Subsystems to Overall LRPS Systems, Showing I/O for Major Routines

1.2.1 The SCHED Program

The SCHED program matches the resources at the naval and private shipyards with the individual ship overhaul requirements. The principal output of this process is a ship/yard assignment file. This file specifies the ship to be overhauled, the overhaul yard, and the time the ship will be in the yard. This file also contains ship-overhaul information relevant to other forecasting programs of LRPS. One such study is the Detailed Drydocking Study (DDS)*.

1.2.2 The DDS Program

The Detailed Drydocking Simulation program (DDS) investigates the allocation to ships of drydock facilities in the shipyard. Ship multiple drydocking and the pre-assignment of ships to drydocks are also considered in this study. The ship/yard assignment file generated by the SCHED program is used as input to the DDS program. DDS generates a ship/drydock schedule or file containing a listing of the ships assigned to drydocks. This file also contains a listing of the ships for which no drydock space was available.

1.2.3 The BURF Program

The BURF program is another data-refinement link in LRPS. BURF uses as its input the ship/drydock schedule produced by DDS. From this schedule BURF prepares a list of ships with their berthing dates for a given shipyard. Berthing dates for a ship are defined as the time intervals a ship spends at a berth and not in a drydock while at the shipyard. These berthing dates are determined from time variables which are the date a ship enters the shipyard, the date a ship enters the drydock, the date a ship leaves the drydock, and the date a ship leaves the shipyard, as specified on the ship/drydock schedule.

---

*Informally documented in NSRDC, CMD Technical Note, CMD-51-71, December 1971, by Jay Mandelbaum

Using the time variables given on the ship/drydock schedule and a ship class berthing utility consumption table, referred to as the Berthing Impact Points Table, the dates of maximum berth utilities usage (peak dates) are determined for a given shipyard. The ships which appear on the ship/drydock schedule and the ships predicted as unscheduled work are the only ships considered for berthing on those peak dates. Assignments of these ships to berths in the shipyard are made with two restraints, electric current and linear space.

BURF produces a summary report which forecasts the utilities required at the berths for each peak date.

2. BURF SYSTEM LOGIC

The BURF system is composed of two independent sub-systems, the Berth Impact Points Per Yard (BIPPY) Program and the Berthing and Utilities Requirements Forecasting Assignment (BURFA) Program. The logic of each of these programs is discussed in the following paragraphs. The essential components of the overall BURF Program and the input/output of the SCHED, DDS, BIPPY, and BURFA programs were shown in Figure 1.

2.1 LOGIC OF THE BIPPY PROGRAM

Program BIPPY determines the dates on which a given yard can expect peak utility loads from berthed ships. This result is derived from two sources of information: the list of scheduled berthing periods for ships in the shipyard, provided on tape by the DDS program; and an estimate of the total utility load for each class of ship, provided on cards as a Berthing Impact Table in which each ship is assigned a number between 0 and 100. This number, the berthing impact points for that ship class, is an indication of the relative total utility load. It does not differentiate among the various kinds of utilities. These numbers are supplied by NAVSHIPS. With these two sets of data BIPPY determines, for each day in the period under consideration, the total impact points for all ships berthed in the shipyard and reports the peak dates. The start and end dates of the period are supplied by the user. Only ships with scheduled yard availabilities are considered by BIPPY.

Certain refinements are made to this peak-determination approach to make it more realistic and useful. The most important one utilizes an average of the loading curve, i.e., of the curve of total berthing impact points for a shipyard vs. time. The loading curve typically shows sharp peaks of one-day duration. These occur when one ship berths and another unberths on the same day. However, it is unrealistic to expect both ships to impose a full load on the shipyard's utilities on that day. Peak day determination is therefore based on a running

average of the impact-point curve over N days, where N is defined by the user to be between 1 and 10. The effect of this averaging is to smooth the loading curve. Selection of a day at the center of a running-average peak will usually avoid the overlap date, which normally occurs at the beginning or end of the span of the running average. The logic flow of BIPPY is shown in Figure 2.

2.2 LOGIC OF THE BURFA PROGRAM

BURFA refines the information contained on the data file produced by DDS by considering only the ships requiring berthing during the periods of peak utility-consumption. It then forecasts the berthing utility requirements based on these selected ship records. BURFA uses a series of tables and associated table-look-up logic in the assignment of ships to berths and in the forecasting of berth utility requirements. The following tables are input as parameters (see Appendix B):

Berth-orientated tables

- Berth identification table (PIER array)
- Berth nesting table (NEST array)
- Berth ship-type preference tables (PIERCL and ICLASP arrays)

Ship-type orientated tables

- Ship-type identification table (SHPCLS array)
- Ship assignment table (SHPASG array)
- Ship-type maintenance-probability table (PROB array)

BURFA has the following three phases of processing:

(1) Selection of the "ship workload" for peak utility-usage periods, i.e., the selection of both scheduled and unscheduled ships which are berthed during any of the peak utility-usage periods.

(2) Assignment of an individual ship to a berth. The restrictions for ship assignment to berths are linear-space and electric current availabilities. Other utilities are only used for forecasts.

(3) Tabulation of the utilities required by the ships berthed at the yard and the utilities actually available at the berths.

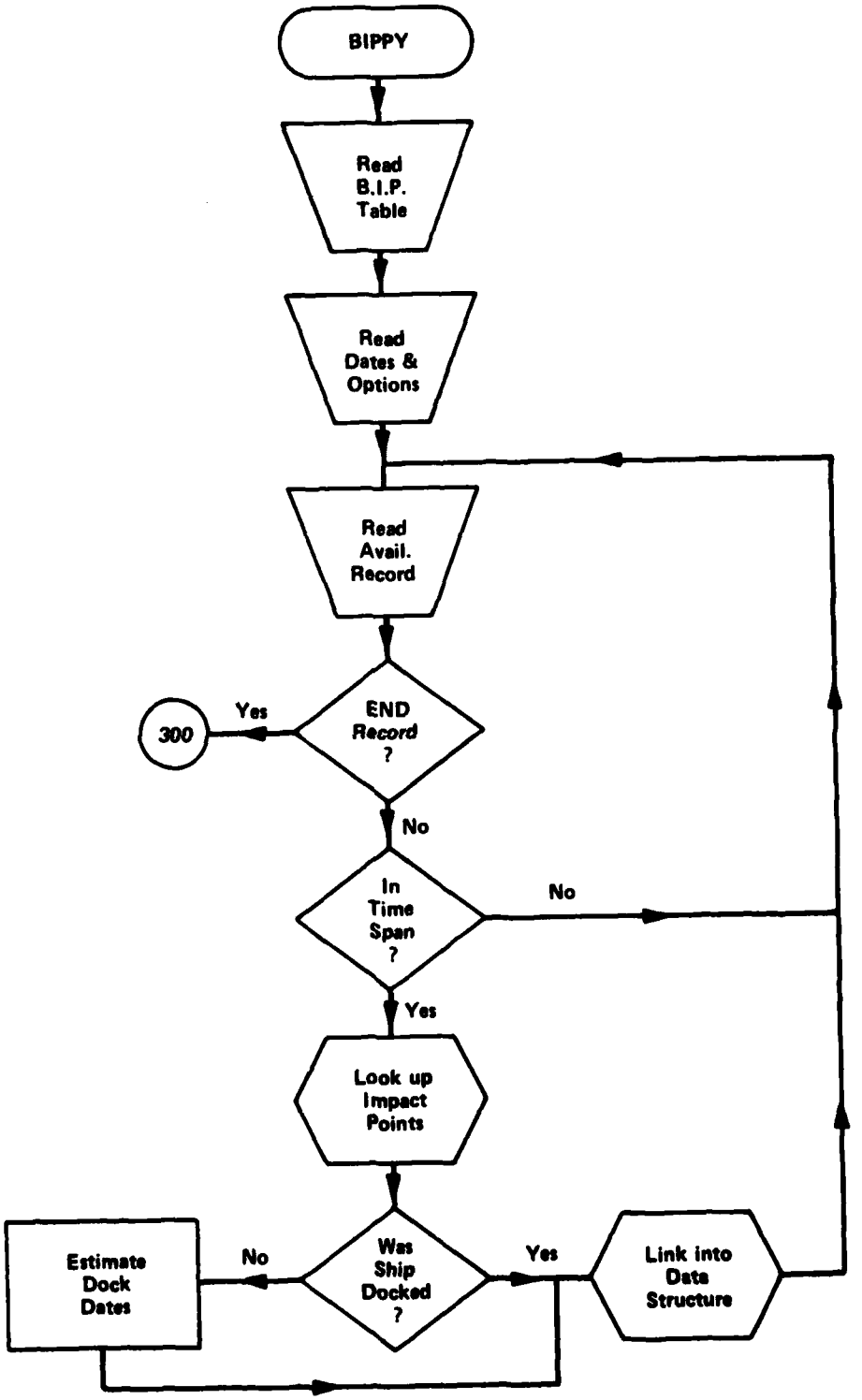


Figure 2 - BIPPY Logic Flowchart

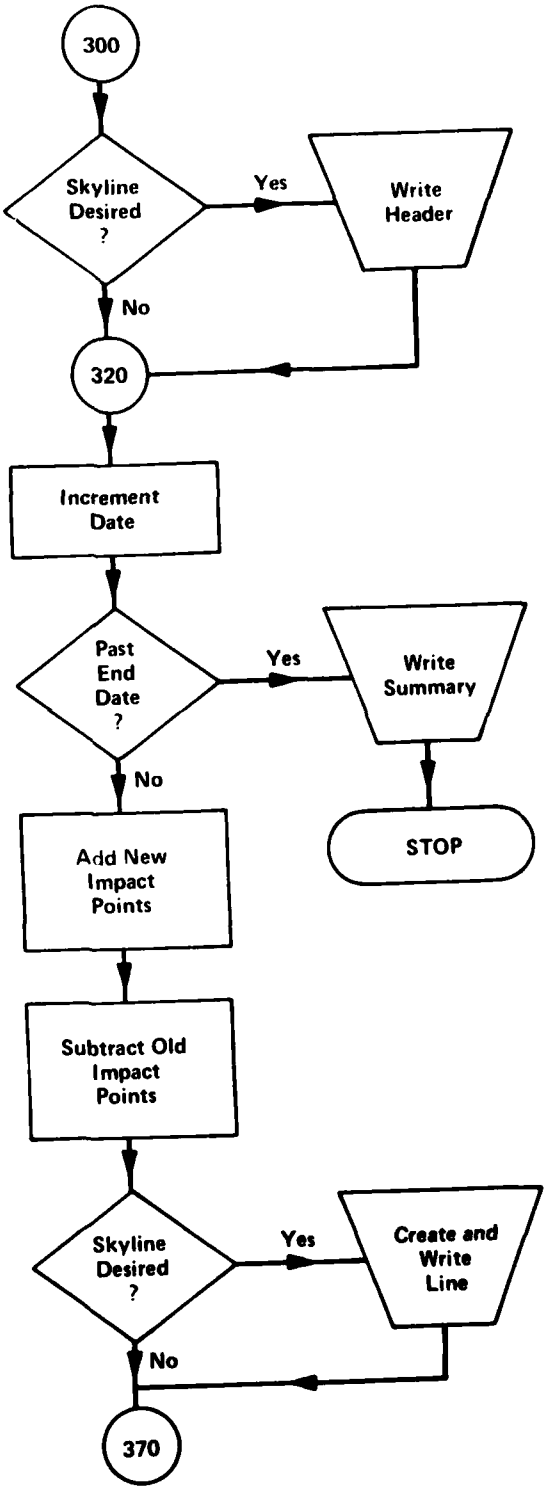


Figure 2 – BIPPY Logic Flowchart (continued)

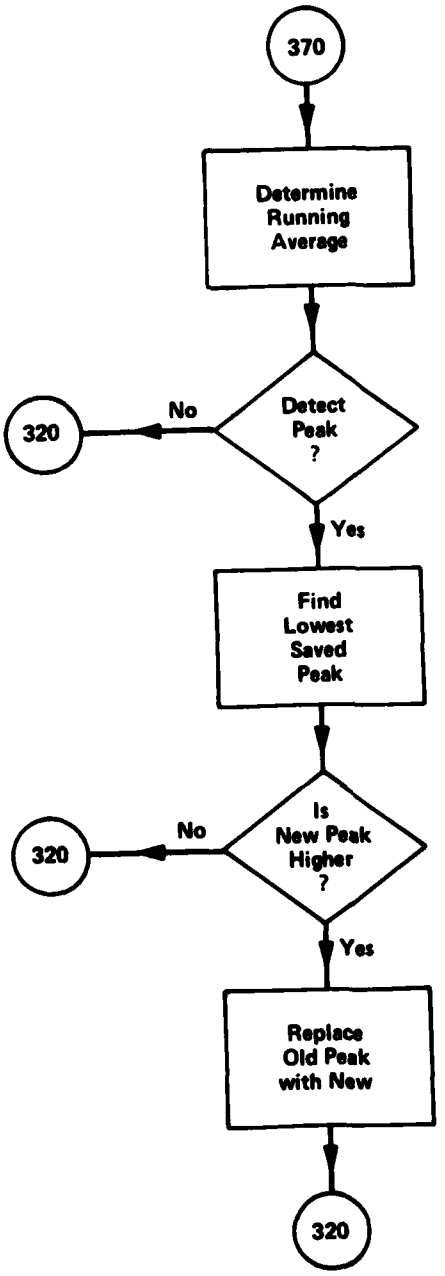


Figure 2 – BIPPY Logic Flowchart (continued)

Each phase is discussed in detail in Section 3 of this report. The logic flow of BURFA is shown in Figure 3.

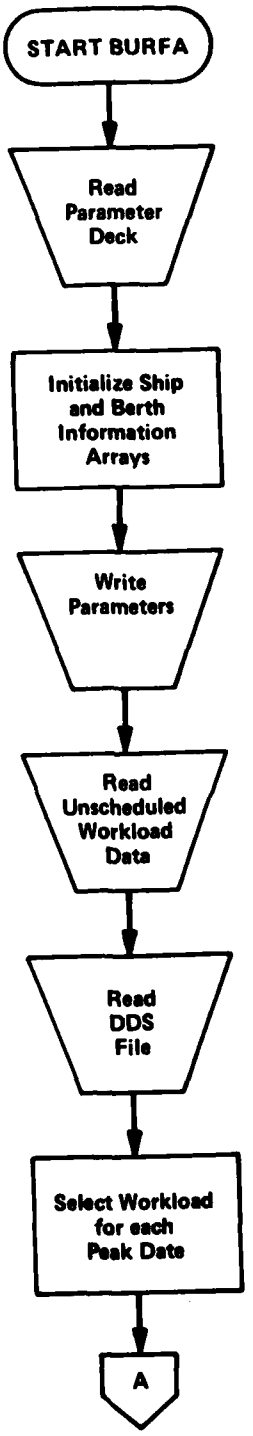


Figure 3 – BURFA Logic Flowchart

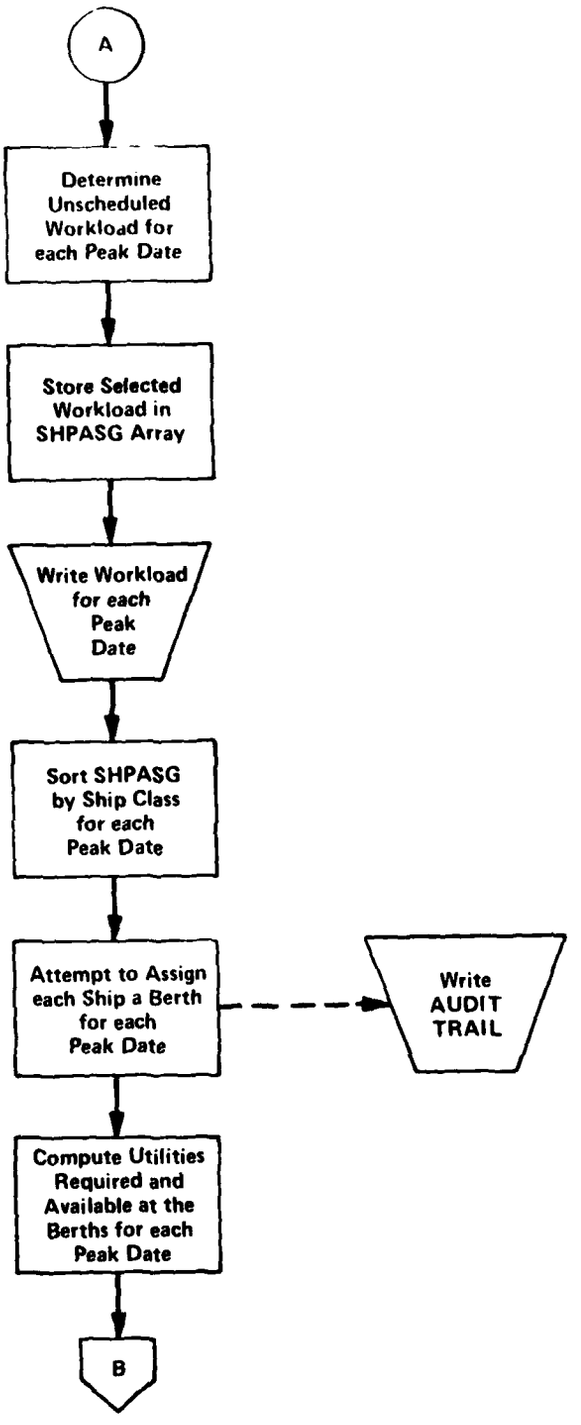


Figure 3 – BURFA Logic Flowchart (continued)

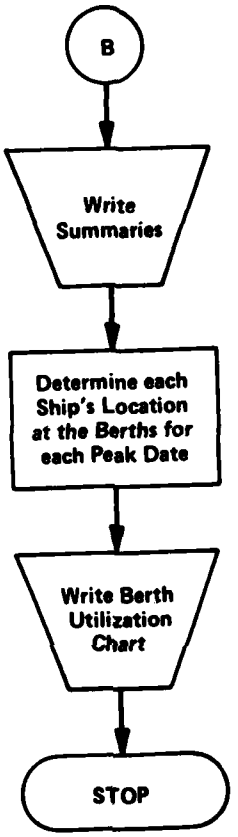


Figure 3 – BURFA Logic Flowchart (continued)

3. BURF SUBROUTINES DESCRIPTIONS

3.1 PROGRAM BIPPY ROUTINES

Flowcharts for Routine BIPPY and its major subroutines are given in Appendix D.

3.1.1 Routine BIPPY

The main routine, BIPPY, reads the berthing schedule one record (i.e., a history of a single berthing) at a time. If any ship on the schedule is to be berthed within the given time period, a data node is created containing the proper impact-point value. Each node is linked with the others by means of two chains, one based on the increasing start dates and the other on the increasing end dates.

Having constructed this data structure, BIPPY steps through the date chains, adding impact points to an accumulator (current sum) upon encountering a start and deleting them on an end. The "skyline" plot* is produced at this time. A series of accumulators is kept and used to determine the running average. Peaks are detected by a drop in the running average and are stored if they exceed the smallest previously stored peak. The smallest previous peak is then deleted. At the end of the period of interest the peaks remaining are summarized in the output, and the routine stops.

3.1.2 Subroutine DAZE

Subroutine DAZE converts the single integer date representation, used internally by BIPPY and BURFA, into the month/day/year notation of the user. The various lengths of the months are considered.

3.1.3 Subroutine IMPACT

Subroutine IMPACT does a table look-up on the ship-type to determine the impact point number. If the table contains no entry for the ship-type, a diagnostic message is printed.

---

*See Sample BIPPY output (page A-11, Appendix A).

3.1.4 Subroutine LINK

Subroutine LINK creates a data node containing information for a single berthing. This node is linked into two chains, one based on increasing start dates and the other on increasing end dates.

3.2 PROGRAM BURFA SUBROUTINES

Flowcharts for Routine BURFA and the major BURFA subroutines are given in Appendix D.

3.2.1 Routine BURFA

The main routine, *BURFA, acts as a system-monitoring routine.* It calls into execution each of the logical links of the program.

3.2.2 Subroutine RDPARM

The read-parameters subroutine, RDPARM, inputs all parameters necessary to perform the simulation. Simulation dates,i.e., peak dates, generated by BIPPY are read from tape 3. Options for the forms of input are also read.

All look-up tables with the exception of SHPASG are initialized in RDPARM.

3.2.3 Subroutine SHPMOD

The ship-module subroutine, SHPMOD, selects ship records from the ship/drydock schedule created by DDS. Only ships which are berthed (i.e., tied up to a pier) on any of the simulation dates are selected.

SHPMOD also estimates an unscheduled ship berthing incidence for each simulation date, using a random-number ship-maintenance probability check over a uniform distribution curve for the year of each simulation date.

The SHPASG (PDN, SN, I) table of BURFA is initialized in this subroutine, where PDN is a number from 1 to 10 which points to the simulation date, SN is a number from 1 to 40 which points to the ship being considered for the simulation date, and I is a pointer indicating storage of ship information.

Table SHPASG is the computer pointer look-up table which contains the ship information derived from the DDS schedule and table pointers necessary for the ship/berth assignment.

3.2.4 Subroutine ASSGN

The berthing-assignment subroutine, ASSGN, uses the tables determined in subroutines RDPARM and SHPMOD for the assignment of ships to berths by priority and by berth-facilities availability. This subroutine sorts those ships which must be berthed on any date of peak utilities usage by ship class and by pre-assignment criteria. This insures that the largest ships and those already pre-assigned a berth are processed first. The sorted ship table, SHPASG, is processed three times for each peak date in an attempt to assign each ship in the table to a berth. Each time the ship table SHPASG, is processed for a peak date, the processing is referred to as a pass through the ship file.

For each berth a ship-type preference is specified in the PIERCL and ICLASP tables, and for each ship-type a berth preference is specified in the SHPCLS table. On the first pass through the ship file, only ships of the type specified as first-choice preference for a particular berth are considered. If a berth has no ship-type preference, it is ignored. The ships that can be assigned to a berth are so marked and removed from the ship file. On the second pass through the file, all the remaining ships and all available berths are considered. The ships which can berth are marked as berthed and removed from the file. On the third pass, all remaining unberthed ships which can be nested are considered. Ship-type nesting specifications are given in the NEST table. All ships which can be nested with ships already berthed are marked and removed from the ship file. A maximum of two ships can be nested in a single berth.

The factors considered for berthing a ship are available berth space (ft) and electric current (ac at 450 volts). Berth space is considered as a restriction for the first two passes through the ship file. Only accessible space available at the berth or pier is considered. If a berth or pier entrance is blocked by the berthing of the ship, the berth or pier is not accessible, and its space cannot be utilized by the ship. Two aspects of electric power are considered in each of the three passes: the electric power available at the base is considered first, then the electric power electric current available at the pier.

All ships not berthed in the three passes are marked in such a way that the indicator specifies the reason for failure.

In summary, a ship can berth only if it meets the following utility requirements:

a. Electric current needed by the ship is less than or equal to the electric current available at a berth or pier.

b. The space needed by the ship is less than or equal to the space available at a berth or pier for a singly berthed ship.

c. The ship does not block an adjacent berth or pier.

3.2.5 Subroutine SUMMY

The summary subroutine, SUMMY, produces two summary reports. The first report provides the forecasting of utilities required and those available at the berths. The utilities considered in this report are electric current (ac at 450 volts), fresh and salt water (gpm), steam power (lb/hr), and berthing space (ft) required.

The second report shows the available electric current generated by each power station and the electric current required by the berths that each station services.

3.2.6 Subroutine GRAPH

The pier-configuration subroutine, GRAPH, shows by graphic output the positioning of ships at the piers. Two symbols are used; "*" is used for ships berthed; "X" is used for unused pier space.

GRAPH also gives a listing of the ships berthed at the pier. Ships singly berthed are separated by commas. Those nested are separated by a plus sign.

3.2.7 Subroutine SORTS

The subroutine, SORTS, sorts the ship file (SHPASG) for a simulation date by ship class numbers. Ship records with low ship class numbers will appear first in the ship file.

3.2.8 System Editing Routine

Flowcharts for the system editing routines are given in Appendix D.

3.2.8.1 Function IBIP

Given the ship-type and hull number, this function determines the ship's berthing and dock classes.

3.2.8.2 Function ICLASS

Given the ship-type, ICLASS returns the berth preference number for the ship (see Appendix B).

3.2.8.3 Function INEST

Given the ship-type and hull number, INEST returns the ship-class nesting number. If this number is equal to zero, the ship cannot be nested with another ship.

3.2.8.4 Function MDATE

Given a calender date specified in terms of month, day, and year, MDATE returns the date in days.

3.2.8.5 Subroutine SORT

The subroutine, SORT, sorts the ship file (SHPASG) for a given simulation date by berth pre-assignment. The ship records with pre-assigned berths will appear first in the ship file.

4. BURF INPUT DATA

4.1 BIPPY INPUT DESCRIPTION AND CARD FORMATS

Program BIPPY requires two main sets of data, the ship workload file generated by DDS and a BIPPY parameter deck. The first of these is a projected ship-availability file for a given shipyard. This file, provided by the LRPS, is referred to as Tape 1 within BIPPY and BURFA and is described in section 4.2.1. The remainder of the data, the BIPPY parameter deck, is supplied by the user on cards. These cards consist of the Berthing Impact Point cards, a header card, and a Date and Option card.

4.1.1 Berthing Impact Point Card Format

These cards constitute the Berthing Impact Point Table. There is one card for each ship class giving the ship-type, the lower and upper hull numbers for the particular class, and that class's berthing impact point. There may be up to 80 such cards, the last of which must begin with the word "END". Figure 4 shows the format for these cards; input variables and formats are described in Table 1.

4.1.2 BIPPY Date And Option Card Format

Following the "END" card is a card containing the alphanumerics used as a header or title on the printed output. The final card, the Date and Option card, contains the start date (month, day, year) of the period to be considered, the end date, the number of days over which the running average (for peak determination) is to be taken, the number of peak dates to be reported (up to 10), an indicator for printed output (1 if the skyline chart is desired, 0 otherwise), and the lower cutoff level below which no impact-point totals will be printed on the skyline chart.

An example of the skyline chart (a histogram of total impact points by dates) is presented in Appendix A. Figure 5 presents the format description for the Date and Option card: variables are described in Table 2.

4.2 BURFA INPUT DESCRIPTION AND CARD FORMATS

BURFA has three input sources:

(1) A ship workload file generated by DDS for ships scheduled to be drydocked at a specified shipyard.

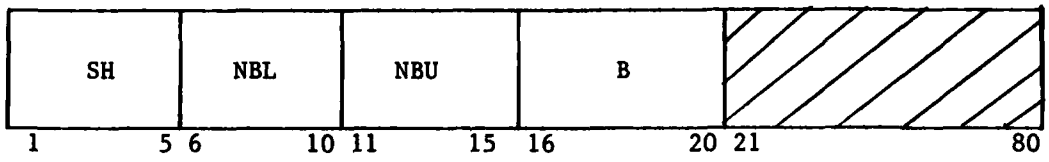


Figure 4 - Berthing Impact Point Card Format

TABLE 1 - BERTHING IMPACT POINT CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
SH	A5	Ship-type name
NBL	I5	Lower limit of ship hull number
NBU	I5	Upper limit of ship hull number
B	I5	Berthing impact point

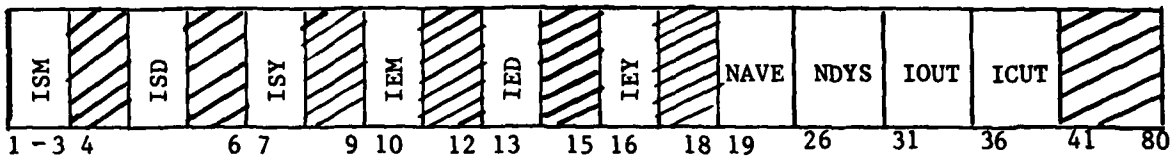


Figure 5 - Date and Option Card Format

TABLE 2 - DATE AND OPTION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
ISM	I2	Start date, month
ISD	I2	Start date, day
ISY	I2	Start date, year
IEM	I2	End date, month
IED	I2	End date, day
IEY	I2	End date, year
NAVE	I7	Period of running average, in days
NDYS	I5	Number of peaks reported
IOUT	I5	Output indicator
ICUT	I5	Output lower cutoff

(2) Dates of maximum berthing utilization, generated by BIPPY for the ship workload file generated by DDS.

(3) BURFA parameter cards.

4.2.1 Input Data Generated by DDS

The list of ships scheduled to dock in a specific time period, the ship workload file, is read by shipyard. This list of ships consists of records which are 80-character card images. These records may be read in either card or tape form. Each ship list is preceded by an identification record and is terminated with an "END" record.

4.2.1.1 Ship Workload Identification Record Format

The ship workload identification record format is shown in Figure 6. Table 3 describes the variables and formats.

4.2.1.2 Ship Workload Records Format

The ship workload records generated by DDS have the format given in Figure 7. Variables formats are described in Table 4.

4.2.1.3 "END" Record Format

The END card has the word END in columns 1-3.

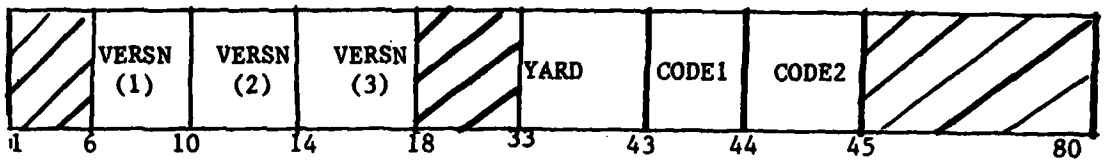


Figure 6 - Ship Workload Identification Record Format

TABLE 3 - SHIP WORKLOAD IDENTIFICATION RECORD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
VERSN (1)	A4	Identifying symbols for "ship workload" file of DDS used in BURFA
VERSN (2)	A4	
VERSN (3)	A4	
YARD	A5	Name of shipyard to be considered
CODE 1	I1	Code number given to shipyard by the SCHED program
CODE 2	I1	

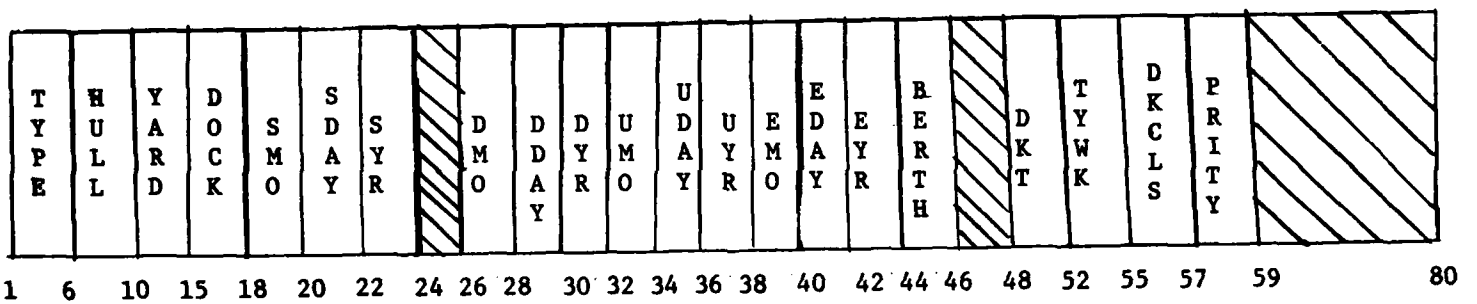


Figure 7 - Ship Workload Record Format

TABLE 4 - SHIP WORKLOAD RECORD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE	A5	Ship-type specification
HULL	I4	Ship hull number
YARD	A5	Overhaul yard
DOCK	A3	Drydock identification
SMO, SDAY, SYR	3I2	Starting docking date
DMO, DDAY, DYR	3I2	Drydocking date
UMO, UDAY, UYR	3I2	Undocking date
EMO, EDAY, EYR	3I2	End docking date
BERTH	A2	If ship is pre-assigned a berth, insert program berth letter. Otherwise blank (See Table 10)
DKT	I4	Drydocking time
TYWK	A3	Type of work to be done at yard
DKCLS	I2	*Size of ship. The greater the ship class number, DKCLS, the smaller the ship size.
PRITY	I2	Priority of shipyard assignment, used by program SCHED

*For consistency in the LRPS Reports DKCLS is equivalent to Ship class.

4.2.2 BURFA Input Data

4.2.2.1 Simulation Dates Record Format 1

This record format, used when JOPT (see 4.2.3.1) is set equal to 2, is shown in Figure 8. The variables and formats used are described in Table 5.

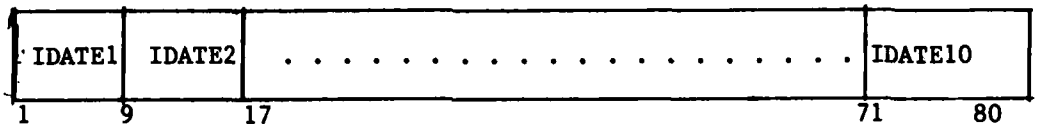


Figure 8 - Simulation Dates Record Format 1

TABLE 5 - SIMULATION DATES RECORD FORMAT 1 DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
IDATE1, IDATE2,...,IDATE10	10I8	Simulation dates, in days

4.2.2.2 Simulation Dates Record Format 2

This record format, used when JOPT (see 4.2.3.1) is set equal to 1, is shown in Figure 9; variables and formats are described in Table 6.

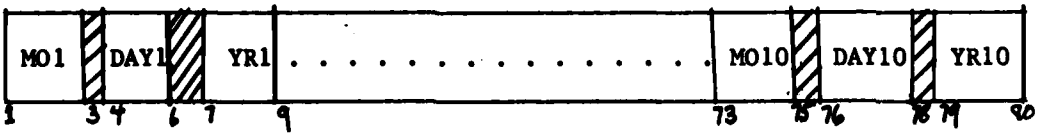


Figure 9 - Simulation Dates Record Format 2

TABLE 6 - SIMULATION DATES RECORD FORMAT 2 DESCRIPTION

VARIABLES	FORMAT	DESCRIPTION
MO1, DAY1, YR1,..., MO10, DAY10, YR10	10(I2,1X,I2,1X,I2)	Simulation dates, in months, days, years

4.2.3 BURFA Parameter Cards Formats

4.2.3.1 BURFA Option Card Format

The BURFA Option Card format is given in Figure 10; variables and formats are described in Table 7.

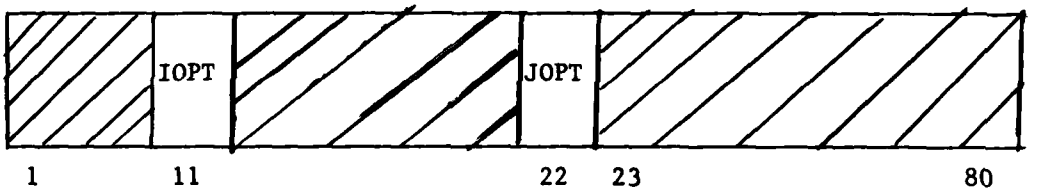


Figure 10 - BURFA Option Card Format

TABLE 7 - BURFA OPTION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
IOPT	I1	Ship workload records input indicator IOPT = 1 indicates card input on standard tape 5 IOPT = 2 indicates tape input to be used with tape unit 1 as input device IOPT = 3 indicates both card and tape are to be used
JOPT	I1	Simulation dates indicator JOPT = 1, card input is to be used JOPT = 2, tape input is to be used with tape unit 3 as its input device

4.2.3.2 The Ship-Type Matrix Cards Format

A Ship-Type Matrix Card specifies the ship-types which take precedence in assignment of a berth. Each Ship-Type Matrix Card is immediately followed by a Berth-Program-Letter Sequence Card (see 4.2.3.3). The maximum number of Ship-Type Matrix Cards is ten. The termination of the ship-type card reading is accomplished by an "END" card. The Ship-Type Matrix Card format is given in Figure 11; the variables and formats are described in Table 8.

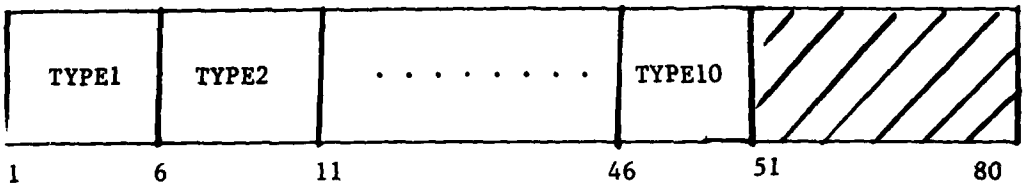


Figure 11 - Ship-Type Matrix Card Format

TABLE 8 - SHIP-TYPE MATRIX CARD FORMAT DESCRIPTION

VARIABLES	FORMAT	DESCRIPTION
TYPE1,TYPE2,...,TYPE10	10A5	Ship-types of ships to have precedence in berth assignment

4.2.3.3 Berth-Program-Letter Sequence Cards Format

A Berth-Program-Letter Sequence Card immediately follows a Ship-Type Matrix Card. It specifies the program letter, given to each berth (see 4.2.3.4), for the berths which have as their first-assignment choice the ship-types specified in the preceding Ship-Type Matrix Card. The maximum number of berths per card is 15 with one card for each Ship-Type Matrix Card. The Berth-Program-Letter Sequence Card format is given by Figure 12; Table 9 describes the variables and formats.

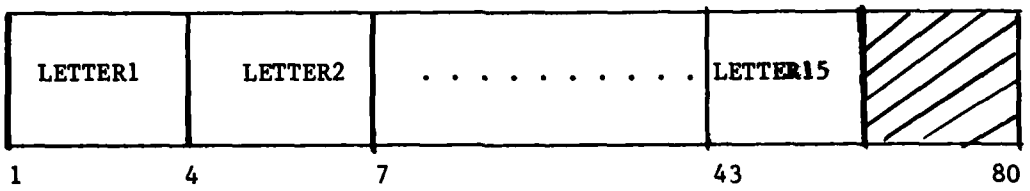


Figure 12 - Berth-Program-Letter Sequence Card Format

TABLE 9 - BERTH-PROGRAM-LETTER SEQUENCE CARD FORMAT DESCRIPTION

VARIABLES	FORMAT	DESCRIPTION
LETTER1, LETTER2,..., LETTER15	15A3	Program letters used for berth identification

4.2.3.2 Berth Identification Card Format

The Berth Identification Card contains a program identification letter and lists the utilities, electric current, water, steam, and linear space at a berth. Berths with the same berth identification letter are considered as one berth with lengths and utilities totaled. The maximum number of individual berths is 100.

Figure 13 provides the Berth Identification Card format; Table 10 describes the variables and formats.

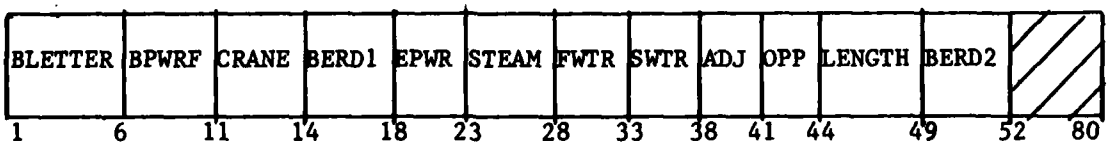


Figure 13 - Berth Identification Card Format

TABLE 10 - BERTH IDENTIFICATION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
BLETTER	A5	Berth letter applies to to program treatment of berths as individual or combined berths
BPWRF	I5	Maximum electric current (ac at 450 volts) available for each linear foot of ship
CRANE	I3	Crane capacity*
BERD1	A3	Berth description
EPWR	I5	Electrical current (ac at 450 volts) available at the berth
STEAM	I5	Steam (lb/hr) available at the berth
FWTR	I5	Fresh water (gpm) available at the berth
SWTR	I5	Salt water (gpm) available at the berth
ADJ	A3	Berth letter of berth adjacent to berth (see Appendix A)
OPP	A3	Berth letter of berth opposite to berth
LENGTH	I5	Berth linear length (ft)
BERD2	A3	Berth description

*Not used in program at present

4.2.3.5 Ship-Type Nesting-Configuration Card Format

The Ship-Type Nesting-Configuration Cards specify the ship-types and hull-number ranges of ships that can be nested in the same berth. The maximum number of Ship-Type Nesting-Configuration Cards is 100. The nesting-card reading is terminated by an "END" card. Figure 14 provides the Ship-Type Nesting Configuration Card format; Table 11 describes the variables and formats.

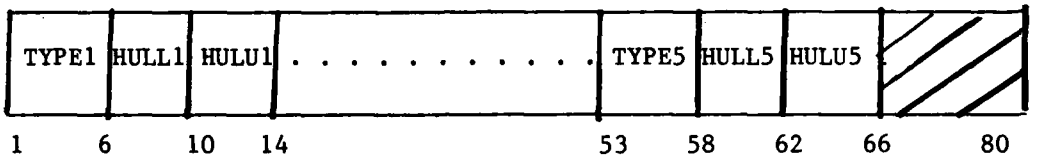


Figure 14 - Ship-Type Nesting-Configuration Card Format

TABLE 11 - SHIP-TYPE NESTING-CONFIGURATION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE1 - TYPE5	A5	Ship-type
HULL1 - HULL5	I4	Hull-number, lower limit
HULU1 - HULU5	I4	Hull-number, upper limit

4.2.3.6 Ship-Type Card Format

The Ship-Type Cards specify all utilities needed by a particular ship-type while at the berth. The maximum number of Ship-Type Cards is 100. The Ship-Type Card reading is terminated by an "END" card. Figure 15 shows the Ship-Type Card format; Table 12 describes the variables and formats.

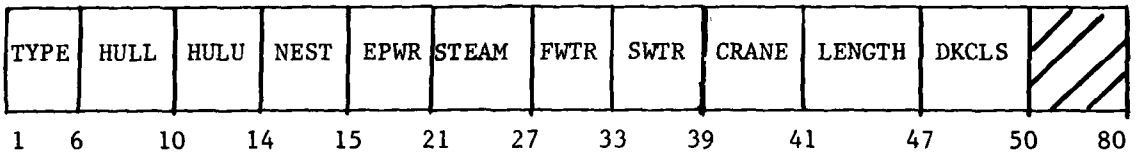


Figure 15 - Ship-Type Card Format

TABLE 12 - SHIP-TYPE CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE	A5	Ship-Type name
HULL	I4	Hull number, lower limit
HULU	I4	Hull number, upper limit
NEST	I1	Ship nesting indicator
		NEST = 0, ship cannot be nested
		NEST = 2, ship can be nested
EPWR	I6	Electric current (ac at 450 volts)
STEAM	I6	Steam power (lb/hr)
FWTR	I6	Fresh water (gpm)
SWTR	I6	Salt water (gpm)
CRANE	I2	Crane specifications*
LENGTH	I6	Linear length of ship (ft)
DKCLS	I3	Ship class

* Not used in program at present

4.2.3.7 Berth Electric Power-Station Card Format

A Berth Electric Power-Station Card specifies the program berth letter names of all those berths being supplied electric power by the same power station. This card also gives a total current (ac at 450 volts) produced by the power station. The maximum number of power-station cards is ten. The maximum number of berths which may be supplied electric power by a single station is nine. The berth power-station reading is terminated by an "END" card. Berth power-station card format is given by Figure 16; Table 13 describes the variables and formats.

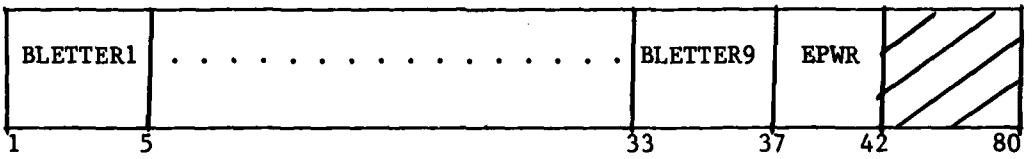


Figure 16 - Berth Electric Power-Station Card Format

TABLE 13 - BERTH ELECTRIC POWER-STATION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
BLETTER1-BLETTER9	9A4	Program berth letters of all berths being supplied by same power station
EPWR	I5	Total electric current produced by station (ac at 450 volts)

4.2.3.8 Unscheduled-Workyear Probability Card Format

The Unscheduled-Workyear Probability Card specifies the sequential years for which unscheduled work probabilities are given and the maximum number of unscheduled ships allowed for each year. The maximum number of years considered is ten. If no ship probabilities are to be read, a blank card is inserted. Figure 17 shows the format for the Unscheduled-Workyear Probability Cards; Table 14 describes the variables and formats.

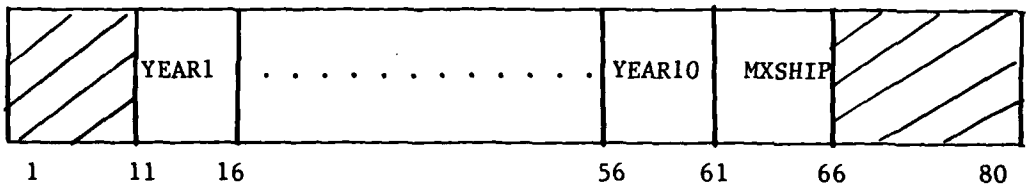


Figure 17 - Unscheduled-Workyear Probability Card Format

TABLE 14 - UNSCHEDULED-WORKYEAR PROBABILITY CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
YEAR1-YEAR10	10I5	Years for which unscheduled ship maintenance probabilities are given
MXSHIP	I5	Maximum number of unscheduled ships per given yard

4.2.3.9 Unscheduled-Work Probability Cards Format

The Unscheduled-Work Probability Cards specify the probabilities that given ship-types will be considered as unscheduled work for a given year. Each probability is given with respect to the corresponding year specified on the Unscheduled-Workyear Probability Card. The maximum number of Unscheduled Work Probability Cards is 40. This card reading is terminated by an "END" card. Figure 18 shows the format for the Unscheduled-Work Probability Cards; Table 15 describes the variables and formats.

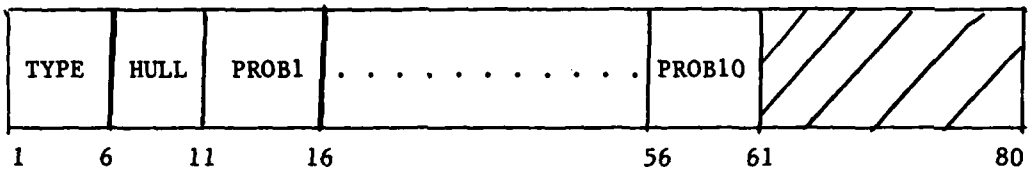


Figure 18 - Unscheduled-Work Probability Card Format

TABLE 15 - UNSCHEDULED-WORK PROBABILITY CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE	A5	Ship-type
HULL	I5	Ship class number
PROB1-PROB10	10F5.2	Probability of unscheduled work for each of the years specified (for specified ship-type)

5. BURF OUTPUT

5.1 BIPPY OUTPUT DESCRIPTION

Two forms of output are available from BIPPY. One of these is simply a list of peak dates, or more specifically the center dates of the peaked running averages. These dates are both printed and placed on tape 3 for use later by BURFA. It is a user option to request from one to ten of these dates. If the user asks for M dates, BIPPY will supply the dates of the M highest peaks within the considered interval. The other output, a "skyline plot" or histogram of actual impact-point totals (not averages) on a daily basis, is optional and may be suppressed. Only totals in excess of a user-defined lower cutoff level are presented in the "skyline plot." Any ships for which no berthing impact points have been defined will be noted on the first page of the printed output.

5.2 BURFA OUTPUT DESCRIPTION

BURFA produces a series of reports. Each report has a report reference number which is specified at the top of each output page. This number is of the format 50-XX-SS, where 50 indicates the LRPS report level which refers to the BURF system, XX indicates the level of printout within the BURF system, and SS indicates the shipyard sequence number.

The reports produced by BURFA are:

Report reference number	Description
50-20-SS	BURFA parameter deck listing
50-13-SS	Ship assignment listing
50-01-SS	Ship Utilities Requirements summary with deficiencies and excesses of utilities specified - listing of ship-berth assignments with diagnostics specifying cause for failure of ship to berth
50-02-SS	Electric power-station utilization listings
50-03-SS	Graphic display of ship berthing configuration
50-04-SS	Audit Trail*

* Computer listing of ship/berth assignment processing. The Audit Trail is printed on tape unit 2.

6. COMPUTER SYSTEM

The BURF Program was designed to run on the NSRDC CDC 6700 computer facility. BURF requires 60K actual words of core. An average computer run requires three minutes per shipyard.

Computer control cards for standard deck setups and ship and shipyard data are available at NSRDC, Code 1863. The computer program listings for the CDC 6700 are given in Appendix D.

BURF has been adapted to run on the IBM 360 computer. For these program listings and the program execution procedures contact NAVSHIPS, Code 70T.

APPENDIX A - BURF Sample Problem

Appendix A provides a sample problem. The problem case consists of a fictitious workload for the Charleston Naval shipyard from 1973 to 1981.

Appendix A also gives a listing of all input to BURF for the problem case.

```
C       SAMPLE BURF INPUT DATA
C       FILE GENERATED BY DDS
      TEST  041172              CHASN              03
DD     890CHASNG01 7 171    7 671 73171 92071   72  26RO 8522   22812   710   4 45
MSO    495CHASNG01 92071    9297110 8711020 71  72  10FO 9852     500   422   7  7
DLG      7CHASNG01 21572    22672 31172 32872   72  15PS 6043    9220     9   7  7
DE    1082CHASNG01 31372    32272 33172 42472   72  10PS 7143    5500  1078   7  7
DE    1088CHASNG01 32772    4 672 42372 5 872   72  18FO 7140    4500  1078   7  7
DD     866CHASNG01 61672    7 572 72972 91572   72  25RO 8522   20188   710  15 45
DE    1092CHASNG01 92572   10 37210207211 672   73  18FO 7140    4500  1078   7  7
MSO    471CHASNG01101772   10287211 672111772   73  10FO 9852     500   422   7  7
DLG     28CHASNG01 4 273    42673 6 473 8 273   73  40RO 4522   31930    26  20 45
DE    1068CHASNG01 51773    6 573 7 973 81773   73  35RO 7122   16995  1052  15 15
DD     837CHASNG01 6 473    71073 8137310 173   73  35RO 8522   25750   710  15 45
DE    1072CHASNG01 71273    81473 91773101273   74  35RO 7122   16995  1052  15 15
DDG     11CHASNG01 82873    9187310 2773122673  74  40RO 7522   36050     2  15 40
DD     840CHASNG01103073   111773122173 22674   74  35RO 8522   19570   710  15 45
AS      31CHASNG01122173    1 174 11574 2 174   74  15PS 5037    6000    31   7  7
DD     963CHASNG01 51575    52675 6 975 63075   75  15PS 4543    8000   963   7  7
DD     965CHASNG01 71575    72575 8 875 82975   76  15PS 4543    6000   963   7  7
DD     822CHASNG01 81775    81975 91875111775   76  31NRT8567   19000   710   0  0
DD    7205CHASNG01 82275    9237510 77512 375   76  15PS 4543    6000   963   7  7
DD     821CHASNG01 82975   10 87511 775112975   76  31NRT8567    9000   710   0  0
SSBN   622CHASNG01111075   11227511267512 175   76   5PS 7237    5000   616   7  7
SSBN   623CHASNG01 2 676    21576 21976 22776   76   5PS 7237    5000   616   7  7
SSBN   624CHASNG01 3 276    31176 31576 32376   76   5PS 7237    5000   616   7  7
DLG     28CHASNG01 9 776   10 276111076 1 477   77  40RO 4522   31930    86  20 45
SSN    649CHASNG0111 176    111176 8 777 13078  77  27ORF 7210  150000   637   5164
SS     416CHASNG01 81777    9 277111577 11378  78  75RO 9816   39052   416  15 15
DD     965CHASNG01112977   121677 11078 3 178   78  26RO 4522   20600   963  15 45
DDG     11CHASNG01122877    11578 21278 32878   78  29RO 7522   43569     2  15 40
DD    7205CHASNG01 3 378    32178 41778 6 578   78  28RO 4522   20600   963  15 45
AS      31CHASNG01 4 378    42078 5247810 278   78  35RO 5040   28840    31  15 15
DD    7403CHASNG01102378   11 17811157812 478   79  15PS 4543    6000   963   7  7
DD    7103CHASNG01 13079    21979 31479 43079   79  24RO 4522   20600   963  15 45
DD    7307CHASNG01 3 279    32179 42479 8 279   79  35RO 4522   20600   963  15 45
DD     867CHASNG02 7 171    7 671 72571 91071   72  20RO 8522   19570   710   0 45
SSN    615CHASNG02 8 271    81071 5 572 8 172   72  27ORO 7110  120000   593   5 74
DD     822CHASNG02 41772    5 672 53072 71772   72  25RO 8522   21256   710  15 45
DD     821CHASNG02 53072    61572 71072 83072   72  26RO 8522   21497   710  15 45
AD      27CHASNG02 61972    71572 81872 91972   72  35RO 7622   16387    26  15 15
SSN    649CHASNG02 8 772    81972 51573 8 373   73  27ORO 7210  120000   637   5 71
SSN    604CHASNG02 5 773    51673 2 974 8 974   73  27ORF 7110  150000   593   5167
SSN    687CHASNG02 21874    3 274 32374 4 174   74  22FO 7125   20000   637   7  7
DDG     19CHASNG02 22874    32774 5 574 7 574   74  40RO 7522   36050     2  15 40
DLG      8CHASNG02 41974    5 674 52574 53074   74  20FO 6040    5000     9   7  7
DD     844CHASNG02 7 174    72074 8147410 174   75  26RO 8522   19570   710  15 45
DLG     13CHASNG02 81974    82974 91274 93074   75  15PS 6043    3000     9   7  7
MSO   7303CHASNG02 92074    9287410 774102074   75  10FO 9852     500     0   7  7
MSO    520CHASNG02102074   10287411 674112074   75  10FO 9852     500   519   7  7
MSO    496CHASNG02102174   11 7741116741 12174  75  10FO 9852     500   422   7  7
DD     763CHASNG0212 274    122274 11575 3 375  75  25RO 8522   19570   710  15 45
DLG      8CHASNG02 21775    22575 31175 33075   75  15PS 6043    3000     9   7  7
DD     866CHASNG02 7 775    72575 8197510 775   76  26RO 8522   19570   710  15 45
SSBN   599CHASNG02 8 475    82475 51976 9 376   76  27ORF 71 4  245000   598   5104
SSN   7201CHASNG02 52076    53076 62076 7 176   76  22FO 7225   20000     0   7  7
DD     839CHASNG02 6 476    62476 71876 9 376   76  25RO 8522   19570   710  15 45
DE    1061CHASNG02 72076    8 876 9117610 2076  77  35RO 7122   16995  1052  15 15
SSBN   602CHASNG02 82076    91276 6 877 92077   77  27ORF 71 4  245000   598   5105
DDG      2CHASNG02 62777    71477 81377 92777   77  31RO 7522   35020     2  15 40
```

SSBN	636CHASNG02 8 277	81877 51478101678	78	270RO	72	4	280000	627	5149		
SSN	660CHASNG02 7 378	7 978 4 479 92879	79	270RF	7210		150000	637	5160		
AE	33CHASNG05 81071	82071 9 371 92371	72	15FO	5551		5000	26	7	7	
AS	18CHASNG0510 671	1024711127711 872	72	35RO	5522		29056	11	15	30	
AE	34CHASNG0511 971	11287112127112207 1	72	15FO	5551		5000	26	7	7	
AE	35CHASNG05 21072	22172 3 672 32372	72	15FO	5551		5000	26	7	7	
DE	1090CHASNG05 7 372	71572 8 172 81472	73	18FO	7140		4800	1078	7	7	
AE	34CHASNG05 72172	8 472 81572 9 172	73	12PS	5554		6000	26	7	7	
SSN	681CHASNG05 71073	72073 8 573 82473	74	17PS	7137		7500	637	7	7	
SSN	683CHASNG05 72473	8 973 83073 9 973*	74	22FO	7225		20000	637	7	7	
DD	938CHASNG0510 473	1023731117773 1 474	74	26RO	7522		34351	931	15	45	
DD	849CHASNG05 71574	8 474 82974101574	75	26RO	8522		19570	710	15	45	
MSO	521CHASNG05102074	10287411 674112074	75	10FO	9852		300	519	7	7	
DD	965CHASNG05103074	11 7741124741216?4	75	18FO	4540		5000	963	7	7	
AD	19CHASNG0511 674	1127741231?4 2 675	75	35RO	5522		19970	14	15	15	
DD	7203CHASNG05 82175	82975 9127510 275	76	15PS	4543		6000	963	7	7	
ATS	7201CHASNG0510 475	1013751017751115?5	76	5PS	9454		300	0	7	7	
AD	27CHASNG05 92076	10 7761110761?2076	77	35RO	7622		19970	26	15	15	
ATS	7302CHASNG05 1 377	11577 11977 21877	77	5PS	9454		300	0	7	7	
SSN	646CHASNG05 2 177	2 97711 577 42878	77	270RF	7210		150000	637	5162		
SSN	7204CHASNG05 11778	12578 21078 3 278	78	17PS	7237		12000	0	7	7	
DD	7305CHASNG05 2 279	21979 31379 5 279	79	23RO	4522		20600	963	15	45	
DD	7401CHASNG05 32079	33179 41479 5 279	79	15PS	4543		6000	963	7	7	
AS	33CHASNG06 8 175	81975 9227512 175	76	35RO	3540		28840	33	15	15	
DE	1091CHASNG06 92275	10 8751111751?2275	76	35RO	7122		16995	1078	15	15	
CG	10CHASNG06 11576	13176 31276 51576	76	42RO	4022		38110	10	15	45	
AS	18CHASNG06 7 976	72976 9 176101176	77	35RO	5522		18540	11	15	30	
DE	1068CHASNG06 91776	10 7761110761?1776	77	35RO	7122		16995	1052	15	15	
DE	1072CHASNG06111276	12 176 1 477 21177	77	35RO	7122		16995	1052	15	15	
DD	7307CHASNG06121576	1 577 11977 2 277	77	15PS	4543		6000	963	7	7	
DLG	13CHASNG06123076	12077 22877 42977	77	40RO	6022		43569	9	20	45	
DD	938CHASNG06 2 477	3 177 32377 5 977*	77	23RO	7522		19570	931	15	45	
DD	7203CHASNG06 1 478	12078 21178 4 378	78	23RO	4522		20600	963	15	45	
SSN	676CHASNG06 2 279	2 97911 579 43080	79	270RF	7110		150000	637	5163		
MSO	422CHASNF12 81771	82571 9 371 91771	72	10FO	9852		300	422	7	7	
MSO	509CHASNF12 81771	9 471 91371 93071	72	10FO	9852		300	508	7	7	
MSO	424CHASNF12 91771	9297110 871101771	72	10FO	9852		300	422	7	7	
MSO	468CHASNF12 1 472	11272 11672 21572	72	5PS	9855		300	422	7	7	
MSO	519CHASNF12 1 472	11772 12172 21572	72	5PS	9855		300	519	7	7	
SS	416CHASNF12 1 372	12272 4 572 6 272	72	75RO	9816		39052	416	15	15	
MSO	422CHASNF12 5 572	51672 52072 61672	72	5PS	9855		300	422	7	7	
MSO	509CHASNF12 5 572	52172 52572 61672	72	5PS	9855		300	508	7	7	
SS	424CHASNF12 6 972	62572 9 772112472	72	75RO	9816		25472	420	15	42	
MSO	459CHASNF12 91872	9287210 772101872	73	10FO	9852		300	422	7	7	
DD	861CHASNF12101272	1013721112?2 11273	73	31NRT	9567		9000	764	0	0	
MSO	459CHASNF12 6 173	61073 61473 71673	73	5PS	9855		300	422	7	7	
MSO	462CHASNF12 7 273	71073 71473 81673	74	5PS	9855		300	422	7	7	
MSO	469CHASNF12 7 273	71573 71973 81673	74	5PS	9855		300	422	7	7	
MSO	471CHASNF12 7 273	72073 72473 81673	74	5PS	9855		300	422	7	7	
MSO	494CHASNF12 7 273	72573 72973 81573	74	5PS	9855		300	422	7	7	
MSO	511CHASNF12 7 273	73073 8 373 81573	74	5PS	9855		300	508	7	7	
MSO	440CHASNF12 91873	9287310 773101873	74	10FO	9852		300	422	7	7	
MSO	494CHASNF12101873	10237311 673111973	74	10FO	9852		300	422	7	7	
SS	487CHASNF12102673	111273 12574 32674	74	75RO	9816		25235	343	15	15	
MSO	440CHASNF12 6 374	61574 61974 71774	74	5PS	9855		300	422	7	7	
SS	523CHASNF12 6 374	62074 9 27411 474	74	75RO	9816		25235	484	15	15	
SS	484CHASNF12 81274	9 374111674 11075	75	75RO	9816		25235	484	15	15	
SS	524CHASNF1212 274	122274 3 675 5 275	75	75RO	9816		25235	343	15	15	
SS	478CHASNF12 42875	51675 72975 92975	75	75RO	9816		25235	484	15	15	
MSO	520CHASNF12 71775	73075 8 375 81775	76	5PS	9855		300	519	7	7	

MSO	521CHASNF12 71775	8 475 8 875 81775	76	5PS 9R55	300	422	7	7
MSO	461CHASNF12 91775	9287510 275111775	76	5PS 9R55	300	422	7	7
DD	861CHASNF12101275	101375111275 11276	76	31NRT9567	9000	764	0	0
SS	420CHASNF12 21376	3 176 32876 51476	76	28RO 9816	25235	420	15	42
SS	425CHASNF12 52776	61476 82776102776	76	75RO 9816	25235	425	15	15
SS	487CHASNF12 92776	101776123076 22577	77	75RO 9816	25235	343	15	15
SS	523CHASNF12 5 477	52077 8 27710 477	77	75RO 9816	25235	484	15	15
SS	490CHASNF12 72177	8 877102177122177	78	75RO 9816	25235	343	15	15
SS	524CHASNF1210 377	102277 1 478 3 278	78	75RO 9816	25235	343	15	15
MSO	425CHASNF15 92071	9297110 871102071	72	10FO 9852	500	422	7	7
MSO	472CHASNF15 2 172	21172 21572 31472	72	5PS 9855	300	422	7	7
MSO	470CHASNF15 2 772	21672 22072 31572	72	5PS 9855	300	422	7	7
MSO	460CHASNF15 21072	22172 22572 31672	72	5PS 9855	300	422	7	7
MSO	424CHASNF15 61572	62572 62972 71572	72	5PS 9855	300	422	7	7
MSO	425CHASNF15 61572	63072 7 472 71572	72	5PS 9855	300	422	7	7
MSO	495CHASNF15 61572	7 572 7 972 71572	72	5PS 9855	300	422	7	7
DD	758CHASNF15 7 372	71072 8 97210 372	73	31NRT9567	9000	692	0	0
SSN	660CHASNG01 3 174	3 77412 174 22875F	74	270RO 7210	120000	637	5	72
MSO	462CHASNF15101772	10287211 672111772	73	10FO 9852	500	422	7	7
MSO	461CHASNF15 91873	9287310 773101873	74	10FO 9852	500	422	7	7
MSO	511CHASNF15101873	10287311 673111973	74	10FO 9852	500	508	7	7
MSO	496CHASNF15 71774	72574 72974 81774	75	5PS 9855	3380	422	7	7
SS	490CHASNF15 82174	9 874112174 12175	75	75RO 9816	25235	343	15	15
MSO	473CHASNF15 61775	62575 62975 71775	75	5PS 9855	300	422	7	7
MSO	7303CHASNF15 61775	63075 7 475 71775	75	5PS 9855	300	0	7	7
SS	522CHASNF15 72677	813771026771227777	78	75RO 9816	25235	484	15	15
DD	844CHASNF18 7 171	7 671 71671 9 171	72	11RO 8522	19570	710	0	45
DDG	10CHASNF18 7 171	72171 82971 1 372	72	40RO 8022	26771	2	15	40
DD	841CHASNF18 81371	83071 92671111571	72	28RO 8522	17792	710	15	45
DD	878CHASNF18 91371	92971102071121071	72	22RO 8522	23785	710	15	45
DD	940CHASNF18102971	11 871112271 11772	72	15PS 8043	6000	931	7	7
DE	1080CHASNF18111571	11237112 271122771	72	10PS 7143	5500	1078	7	7
DE	1086CHASNF18122071	122871 11472 13072	72	18FO 7140	4900	1078	7	7
DE	1081CHASNF18 1 572	11772 12672 21672	72	10PS 7143	5500	1078	7	7
SSN	603CHASNF18 11072	12772102272 41373	72	270RF 7110	150000	593	5	168
MSO	469CHASNF18101772	10287211 672111772	73	10FO 9852	500	422	7	7
DD	865CHASNF18102072	11 772121172 21673	73	35RO 8522	25750	710	15	45
DE	1094CHASNF18121172	122272 1 873 12273	73	18FO 7140	4900	1078	7	7
DD	839CHASNF18 2 573	22573 31873 5 473	73	22RO 8522	19570	710	15	45
SSBN	610CHASNF18 4 973	41673 11074 51074	73	270RF 72 4	260000	608	5	106
DD	881CHASNF18121773	11174 21474 41574	74	35RO 8522	19570	710	15	45
DD	872CHASNF18 21474	3 274 32674 51674	74	25RO 8522	19570	710	15	45
DDG	2CHASNF18 22574	32774 5 574 62474	74	40RO 7522	43569	2	15	40
DDG	18CHASNF18 32674	5 674 61474 72374	74	40RQ 7522	36050	2	15	40
DD	841CHASNF18 7 174	72074 8147410 174	75	26RO 8522	19570	710	15	45
DD	942CHASNF18 8 174	81974 92274112974	75	35RO 7522	25750	931	15	45
MSO	473CHASNF18 92074	9287410 774102074	75	10FO 9852	500	422	7	7
DD	867CHASNF1810 174	101874111474 1 375	75	28RO 8522	19570	710	15	45
DDG	10CHASNF18101574	111774122674 21175	75	40RO 7522	43569	2	15	40
DD	878CHASNF18 11075	12675 3 175 5 975	75	35RO 8522	19570	710	15	45
DD	890CHASNF18 3 375	32275 41875 6 575	75	28RO 8522	19570	710	15	45
SSN	676CHASNF18 4 175	42175 11576 33076	75	270RO 7210	120000	637	5	74
DE	1044CHASNF18 1 276	12176 22476 4 276	76	35RO 7122	16995	1040	15	15
DD	865CHASNF18 2 276	22576 32076 5 376	76	25RO 8522	19570	710	15	45
ATS	7302CHASNF18 41676	42576 5 176 52876	76	7FO 9451	300	0	7	7
DE	1059CHASNF18 5 376	52076 62376 8 376	76	35RO 7122	16995	1052	15	15
SSN	638CHASNF18 6 176	62476 32077 83077	76	270RF 7210	150000	637	5	164
SSN	669CHASNF18 6 177	6 977 3 578 83078	77	270RF 7210	150000	637	5	164
DD	763CHASNF18 4 378	4 578 42578 6 378	78	21NRT8567	9000	710	0	0
DD	878CHASNF18 6 978	62978 72478 9 978	78	26RO 8522	19570	710	15	45

```
DE   1091CHASNF18 12279   2 979 31579 42779  79  35RO 7122  16995 1078 15 15
DE   1044CHASNF18 5 379   52079 62379 8 379  79  35RO 7122  16995 1040 15 15
END
```

183

```
C       SAMPLE BIPPY PARAMETER DECK
AD        1    36   14
AD       37  9999   18
AE        1    25   13
AE       26  9999   16
AF        1  9999   13
AFS       1  9999   15
AG        1  9999    6
AGDE      1  9999   14
AGEH      1  9999    0
AGS       1  9999
AGSS      1  9999    6
AO        1    97   14
AO       98  9999   18
AOE       1  9999   24
AOG       1  9999    8
AOR       1  9999   19
AR        1    21   13
AR       22  9999   18
ARC       1  9999   13
ARS       1  9999    6
AS        1    30   16
AS       31  9999   18
ASR       1  9999    8
ATF       1  9999    6
ATS       1  9999    8
ATSS      1  9999    6
CA        1  9999   21
CC        1  9999   17
CG        1  9999   22
CGN       1  9999   25
CLG       1  9999   19
CVA       1    40   26
CVA      41    58   29
CVA      59    62   33
CVA      63  9999   32
CVAN      1    67   35
CVAN     68  9999   38
CVS       1    40   26
CVS      41  9999   29
CVT       1  9999   26
DD        1   930   12
DD      931   962   14
DD      963  9999   16
DDG       1    36   14
DDG      37  9999   18
DE        1  1051   11
DE     1052  9999   13
DEG       1  9999   14
DER       1  9999   11
DLG       1  9999   16
DLGN      1    35   18
DLGN     36  9999   20
LCC       1    18   12
LCC      19  9999   17
LHA       1  9999   28
LKA       1  9999   15
LPD       1    13   15
LPD      14  9999   16
LPH       1  9999   16
```

```
LSD        1    35    14
LSD       36  9999    16
LST        1  1178    13
LST     1179  9999    15
LPSS       1  9999     8
MSC        1  9999     0
MSH        1  9999     0
MSO        1  9999     0
PG         1  9999     0
PGH        1  9999     0
SS         1  9999     6
SSN        1   636    12
SSN      637   670    13
SSN      671   687    14
SSN      688  9999    18
SSBN       1   659    18
SSBN     660  9999    20
TAK        1  9999     0
END
CHARLESTON          FY 73 - 81          BERTHING IMPACT POINTS
07/01/72 06/30/81        1    1    1   85
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C        SAMPLE BURFA PARAMETER DECK
                3          2
CVA  CVAN CVS  CVT  CV   CVN                                                    CHASN
                                                                               CHASN
AOE  CA   CC   CG   CLG  DD   DDG  DE   DEG  DLG                               CHASN
I  H  G
SSN  SSBN                                                                      CHASN
F  E
SS                                                                             CHASN
J
END                                                                            CHASN
J          352  1400 4000  208 1000I       1045C/S                            CHASN
I          314  4400 6000  400 2800J  H    1060D/N                            CHASN
H          314  4400        30  400G  I    1111D/S                            CHASN
G          317B 6400 7000  200 2000H       1200F/N                            CHASN
F          317D 2800 2000  130 3200   E     450G/S                            CHASN
E          317D 4000 2000  130 3200D  F     745G/N                            CHASN
D          317E 4200 8000   65  250E  C     650H/N                            CHASN
C          317E 4800 2000  130 1300B  D     650H/S                            CHASN
B          317F 2400 7000  130 1500C  A     650J/N                            CHASN
A          317F 2600 7000  130 1500   B     650J/S                            CHASN
END                                                                            CHASN
DD      1 962DDG      19999DE       19999                                      CHASN
DD    962 999DLG      19999                                                    CHASN
AGSS    19999LPSS     19999SS       19999                                      CHASN
AOG     19999ATF      19999ATS      19999ARS      19999ASR      19999          CHASN
END                                                                            CHASN
AD       1  362   920 19200   100  2500      531 76
AD     379999  2600 20200   100  2500      645 35
AE       1  25  1780 10300   100  2000      512 80
AE     269999  1780 10300   100  2000      564 55
AF      19999  1030  4100   100  2000      502 80
AFS     19999  1450  6000   200  2500      581 50
AG      19999  1000  9300   100  2000      564 94
AGDE    19999  1325  3700    50  1250      415 71
AGS    199992   300         25  1000      342 98
AGSS   199992   300         25  1000      342 98
AO       1  97  1400  4400    50  2000      644 76
AO     989999  1840  9300    50  2000      655 55
AOG    199992   130  4400    50  2000      325 94
AOE     19999  1800  9300   200  3000      793 30
AOR     19999  1980  9300   100  3000      659 30
AR       1  21  1400 13700   100  2500      530 76
AR     229999  1850 13700   100  2500      530 35
ARC    199992   570  4400    50  2000      426 98
ARS    199992   100  1500    25   500      214 99
AS       1  36  2320 20200   100  2500      644 35
AS     319999  2320 20200   100  2500      644 35
ASR    199992   510  2900    50  1250      251 80
ATF    199992    80  2100    25   500      205 99
ATS    199992   460  1500    25   500      283 98
ATSS   199992   300         25  1000      342 98
AVM    299990  1000  4000   100  2500      550 55
CA      19999  3530 14300   200  2500      717 40
CV       1  40  3600 31700   300  3500      899 20
CVA      1  40  3600 31700   300  3500      899 20
CVS      1  40  3600 31700   300  3500      899 20
CVT     19999  3600 31700   300  3500      899 20
CV      41  59  6350 36500   300  3500      968 10
CVA     41  59  6350 36500   300  3500      968 10
```

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CVS     419999    4950              300                 968 10
CV       59  62   7200 39500       300  3500          1080  5
CVA      59  62   7200 39500       300  3500          1080  5
CV      639999   10000 50000       300  3500          1046  5
CVA     639999   10000 50000       300  3500          1046  5
CVAN      1  67  10550 50000       300  3500          1100  5
CVN       1  67  10550 50000       300  3500          1100  5
CVAN    689999   10850 50000       300  3500          1100  5
CVN     689999   10850 50000       300  3500          1100  5
CC       19999    3150 15000       200  3000           634 40
CG       19999    3530 13300       200  2500           674 40
CGN      19999    3580 17600       200  3000           721 30
CLG      19999    2730 13000       200  2500           610 45
DD       1 9302   1110  5000        50  1250           390 95
DD       1  930   1350  5000        25  1250           418 75
DD     931 9622   1350  5000        50  1250           418 75
DDG      1  362   1840  7000        50  1250           493 75
DDG    379999    2680  7000        50  1250           493 45
DE      110512    900  3700        50  1250           415 71
DE   105299992   1400  3700        50  1250           638 72
DEG    199992    1300  3700        50  1250           432 71
DER    199992    900   3700        50  1250           306 98
DLG    199992   2680  7000        65  2000           547 50
DLGN     1  35   3500 10000        65  3000           565 50
DLGN   369999    4300 12000       100  3000           596 45
LCC      1  18   2650  9300       100  2500           459 75
LCC    199999    3450  9800       150  2500           620 75
LHA     19999    6000 31700       300  3500           820 20
LKA     19999    1780  8000       100  2500           576 55
LPA     19999    1800 12600       100  2500           490 80
LPD      1  13   1850  5600       100  2000           569 35
LPD    149999    1850  5600       100  2000           570 35
LPH     19999    2680 24000       180  2500           592 35
LPSS   199992     300               25  1000           322 98
LSD      1  35   1100  6900       100  2000           510 76
LSD    369999    1500  7000       100  2000           555 55
LST     11178     950  4000        50  1250           445 80
LST  11799999    1850  4000        50  1250           523 60
SS     199992     300               25  1000           350 98
SSAN     1 659    1700              25  1200           425 72
SSBN  6609999                       25  1200           425 72
SSN      1 636    1750              25  1000           320 71
SSN    637 670    1700              25  1000           320 72
SSN    671 687    1700              25  1000           320 72
SSN   6889999    3700              25  2000           400 72
TAK     19999     200  4100        95  2000           520 55
AGEM    19999                       3   500           220 99
MSC     19999          400          3   500           144 99
MSO     19999         1400          3  1100           190 99
PG      19999         1200          3   500           165 99
PGH     19999                       3   500            75 99
END
J   I   H                                    7650
A   B   C   D   E   F                       15600
END
CHASN          72   73   74   75   76   77   78   79   80   81   1        CHASN
AD      40      3    3    3    3    3    3    3    3    3    3             CHASN
AE      29      3    3    3    3    3    3    3    3    3    3             CHASN
AOR     17      5    3    3    3    3    3    3    3    3    3             CHASN
ARS     67      2    2    2    2    2    2    2    2    2    2             CHASN
```

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AS      22    4    4    4    4    4    4    4    4    4    4                CHASN
ASR     69    2    2    2    2    2    2    2    2    2    2                CHASN
ATF     68    3    3    3    3    3    3    3    3    3    3                CHASN
ATS     70                     10    4    4    4    4    9    6             CHASN
AOG     60    2    2    2    2    2    2    2    2    2    2                CHASN
DD       1   17   12   12   11   10    4    4    4    4    4                CHASN
DD     931                     5    7   14   21   21   21   21             CHASN
DDG     44   10   10   10   10   10   10   10   10   10   10                CHASN
DE    1052    6   16   15   12   12   12   12   12   12   12                CHASN
DLG     32   10   10   10   12   12   12   12   12   12   12                CHASN
SS      64   20   15   14   14   13   11   11   11    8    8                CHASN
SSN    653   10   12   14   14   14   14   14   14   14   14                CHASN
END                                                                        CHASN
SS   1111CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
SS   2222CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
SS   6333CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
SS   4444CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
SS   5555CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
SS   6666CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
SS   7777CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
CVA    39CHASNF12102673  111273 12574 32674H 74  75RO 9816  25235  343 15 15
SSN  7777CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
AD    111CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
AD    222CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
AD    332CHASNF12102673  111273 12574 32674  74  75RO 9816  25235  343 15 15
END
```

CHARLESTON FY 73 - 81 BERTHING IMPACT POINTS

DATE	POINTS	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
2/18/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/19/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/20/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/21/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/22/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/23/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/24/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/25/74	100	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/26/74	88	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/27/74	88	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/28/74	102	XXXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 1/74	115	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 2/74	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 3/74	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 4/74	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 5/74	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 6/74	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/23/74	98	XXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/24/74	98	XXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/25/74	98	XXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/26/74	110	XXXXXXXXXXXXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/ 5/74	100	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/22/75	105	XXXXXXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/23/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/24/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/25/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/26/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/27/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/28/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/11/75	97	XXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/12/75	109	XXXXXXXXXXXXXXXXXXXXXXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/13/75	109	XXXXXXXXXXXXXXXXXXXXXXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/14/75	109	XXXXXXXXXXXXXXXXXXXXXXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/15/75	101	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/16/75	101	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/17/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/18/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/19/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/20/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/21/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/26/75	99	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/27/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/28/75	89	XXXXX.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8/17/77	88	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4/24/79	90	XXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4/25/79	90	XXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4/26/79	90	XXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

THE PEAK DAYS BASED ON RUNNING AVERAGES OVER 1 DAYS.

DATE	POINTS
3/ 1/74	115

BERTHING AND UTILITIES
REQUIREMENTS FORECAST
PROGRAM

08-18-83 TEST 041172

CHASN

NO.OF SHIP BERTHING CLASSES= 84,NO.OF BERTH PREFERENCE CLASSES= 4,NO.OF SINGLE BERTHS= 10,NO.OF COMBINED ACTIVE BERTHS= 0

SIMULATION DATES

3/ 1/74 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0

BERTH PREFERENCE (1ST CHOICE) MATRIX

PREFERENCE GROUP	PREFERENCE TABLE BERTHS FIRST PASS
1	
2	I H G
3	F E
4	J

GROUP	SHIP TYPES									
1	CVA	CVAN	CVS	CVT	CV	CVN				
2	AOE	CA	CC	CG	CLG	DD	DDG	DE	DEG	DLG
3	SSN	SSBN								
4	SS									

NESTING COMBINATION GROUPS

GROUP	TYPE	RANGE	TYPE	RANGE	TYPE	RANGE	TYPE	RANGE	TYPE	RANGE
1	DD	1 962	DDG	1 9999	DE	1 9999		-0 -0		-0 -0
2	DD	962 999	DLG	1 9999		-0 -0		-0 -0		-0 -0
3	AGSS	1 9999	LPSS	1 9999	SS	1 9999		-0 -0		-0 -0
4	AOG	1 9999	ATF	1 9999	ATS	1 9999	ARS	1 9999	ASR	1 9999

** EACH SHIP IN EACH GROUP CAN BE DOUBLE BERTHED WITH ANY OTHER SHIP IN THE SAME GROUP

58-11-03 TEST 041172 CHASN

BERTH IDENTIFICATION CAPABILITY TABLE

SEQ NO	PROGRAM	SHIPYARD	CRANE	EPWR	STMP	FWTR	SWTR	LENGTH	ADJ	OPP
1	J	C/S 352	-0	1400	4000	208	1000	1045	I	
2	I	D/N 314	-0	4400	6000	480	2800	1060	J	H
3	H	D/S 314	-0	4400	-0	30	400	1111	G	I
4	G	F/N 317B	-0	6400	7000	200	2000	1200	H	
5	F	G/S 317D	-0	2800	2000	130	3200	450		E
6	E	G/N 317D	-0	4000	2000	130	3200	745	D	F
7	D	H/N 317E	-0	4200	8000	65	250	650	E	C
8	C	H/S 317E	-0	4800	2000	130	1300	650	B	D
9	B	J/N 317F	-0	2400	7000	130	1500	650	C	A
10	A	J/S 317F	-0	2600	7000	130	1500	650		B

CHASN

50-11-03 TEST G41172

POWER STATION IDENTIFICATION

POWER STATION	BERTHS						AMPS
1	J	I	H				7650
2	A	B	C	D	E	F	15600

UNASSIGNED WORK PROBABILITIES

SHIP	HULL	72	73	74	75	76	77	78	79	80	81
AD	40	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
AE	29	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
AOR	17	.05	.03	.03	.03	.03	.03	.03	.03	.03	.03
ARS	67	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
AS	22	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
ASR	69	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
ATF	68	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
ATS	70	-0.00	-0.00	-0.00	.10	.04	.04	.04	.04	.09	.06
AOG	60	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
DD	1	.17	.12	.12	.11	.10	.04	.04	.04	.04	.04
DD	931	-0.00	-0.00	-0.00	.05	.07	.14	.21	.21	.21	.21
DDG	44	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
DE	1052	.06	.16	.15	.12	.12	.12	.12	.12	.12	.12
DLG	32	.10	.10	.10	.12	.12	.12	.12	.12	.12	.12
SS	64	.20	.15	.14	.14	.13	.11	.11	.11	.08	.08
SSN	653	.10	.12	.14	.14	.14	.14	.14	.14	.14	.14
END	-0	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00

SHIP IDENTIFICATION

SHIP REQUIREMENTS TABLE

SHIP BERTHING CLASS	BERTHING PREF	TYPE	HULL	NEST	EPWR	STMP	FWTR	SWTR	CRANE	LTSHP	DKCLS
1	5	AO	1 36	2	920	19200	100	2500	-0	531	76
2	5	AO	37 9999	-0	2600	20200	100	2500	-0	645	35
3	5	AE	1 25	-0	1700	10300	100	2000	-0	512	80
4	5	AE	26 9999	-0	1700	10300	100	2000	-0	564	55
5	5	AF	1 9999	-0	1030	4100	100	2000	-0	502	80
6	5	AFS	1 9999	-0	1450	6000	200	2500	-0	501	50
7	5	AG	1 9999	-0	1000	9300	100	2000	-0	564	90
8	5	AGDE	1 9999	-0	1325	3700	50	1250	-0	415	71
9	5	AGS	1 9999	2	300	-0	25	1000	-0	342	90
10	5	AGSS	1 9999	2	300	-0	25	1000	-0	342	90
11	5	AO	1 97	-0	1400	4400	50	2000	-0	644	76
12	5	AO	98 9999	-0	1040	9300	50	2030	-0	655	55
13	5	AOG	1 9999	2	130	4400	50	2000	-0	325	90
14	2	AOE	1 9999	-0	1000	9300	200	3000	-0	793	30
15	5	AOR	1 9999	-0	1900	9300	100	3000	-0	659	30
16	5	AR	1 21	-0	1400	13700	100	2500	-0	530	76
17	5	AR	22 9999	-0	1050	13700	100	2500	-0	530	35
18	5	ARC	1 9999	2	970	4400	50	2000	-0	420	90
19	5	ARS	1 9999	2	100	1500	25	500	-0	214	99
20	5	AS	1 36	-0	2320	20200	100	2500	-0	644	35
21	5	AS	31 9999	-0	2320	20200	100	2500	-0	644	35
22	5	ASR	1 9999	2	510	2900	50	1250	-0	251	80
23	5	ATF	1 9999	2	80	2100	25	500	-0	235	99
24	5	ATS	1 9999	2	460	1500	25	500	-0	203	90
25	5	ATSS	1 9999	2	300	-0	25	1000	-0	342	90
26	5	AVM	2 9999	0	1000	4000	100	2500	-0	559	55
27	2	CA	1 9999	-0	3530	14300	200	2500	-0	717	40
28	1	CV	1 40	-0	3600	31700	300	3500	-0	899	20
29	1	CVA	1 40	-0	3600	31700	300	3500	-0	899	20
30	1	CVS	1 40	-0	3600	31700	300	3500	-0	899	20
31	1	CVT	1 9999	-0	3600	31700	300	3500	-0	899	20
32	1	CV	41 58	-0	6350	36500	300	3500	-0	968	10
33	1	CVA	41 58	-0	6350	36500	300	3500	-0	968	10
34	1	CVS	41 9999	-0	4950	-0	300	-0	-0	968	10
35	1	CV	59 62	-0	7200	39500	300	3500	-0	1000	5
36	1	CVA	59 62	-0	7200	39500	300	3500	-0	1000	5
37	1	CV	63 9999	-0	10000	50000	300	3500	-0	1046	5
38	1	CVA	63 9999	-0	10000	50000	300	3500	-0	1046	5
39	1	CVAN	1 67	-0	10550	50000	300	3500	-0	1100	5
40	1	CVN	1 67	-0	10550	50000	300	3500	-0	1100	5
41	1	CVAN	68 9999	-0	10050	50000	300	3500	-0	1100	5
42	1	CVN	68 9999	-0	10050	50000	300	3500	-0	1100	5
43	2	CC	1 9999	-0	3150	15000	200	3000	-0	634	40
44	2	CG	1 9999	-0	3530	13300	200	2500	-0	674	40
45	5	CGN	1 9999	-0	3500	17000	200	3000	-0	721	30
46	2	CLG	1 9999	-0	2730	13000	200	2500	-0	610	45
47	2	DD	1 930	2	1110	5000	50	1250	-0	390	95
48	2	DD	1 93	0	1350	5000	25	1250	-0	410	75
49	2	DD	931 962	2	1350	5000	50	1250	-0	410	75

SHIP IDENTIFICATION

SHIP REQUIREMENTS TABLE

SHIP BERTHING CLASS	BERTHING PREF	TYPE	HULL		NEST	EPWR	STMP	FWTR	SWTR	CRANE	LTSHP	OKCLS
50	2	DDG	1	36	2	1840	7000	50	1250	-0	493	75
51	2	DDG	37	9999	-0	2680	7000	50	1250	-0	493	45
52	2	DE	1	1051	2	900	3700	50	1250	-0	415	71
53	2	DE	1052	9999	2	1400	3700	50	1250	-0	438	72
54	2	DEG	1	9999	2	1300	3700	50	1250	-0	432	71
55	5	DER	1	9999	2	900	3700	50	1250	-0	306	98
56	2	DLG	1	9999	2	2680	7000	65	2000	-0	547	50
57	5	DLGN	1	35	-0	3500	10000	65	3000	-0	565	50
58	5	DLGN	36	9999	-0	4300	12000	100	3000	-0	596	45
59	5	LCC	1	18	-0	2650	9300	100	2500	-0	459	75
60	5	LCC	19	9999	-0	3450	9800	150	2500	-0	620	75
61	5	LHA	1	9999	-0	6000	31700	300	3500	-0	820	20
62	5	LKA	1	9999	-0	1780	8000	100	2500	-0	576	55
63	5	LPA	1	9999	-0	1800	12600	100	2500	-0	490	80
64	5	LPD	1	13	-0	1850	5600	100	2000	-0	569	35
65	5	LPD	14	9999	-0	1850	5600	100	2000	-0	570	35
66	5	LPH	1	9999	-0	2680	24000	100	2500	-0	592	35
67	5	LPSS	1	9999	2	300	-0	25	1000	-0	322	98
68	5	LSD	1	35	-0	1100	6900	100	2000	-0	510	76
69	5	LSD	36	9999	-0	1500	7000	100	2000	-0	555	55
70	5	LST	1	1178	-0	950	4000	50	1250	-0	445	80
71	5	LST	1179	9999	-0	1850	4000	50	1250	-0	523	60
72	4	SS	1	9999	2	300	-0	25	1000	-0	350	98
73	3	SSBN	1	659	-0	1700	-0	25	1200	-0	425	72
74	3	SSBN	660	9999	-0	-0	-0	25	1200	-0	425	72
75	3	SSN	1	636	-0	1750	-0	25	1000	-0	320	71
76	3	SSN	637	670	-0	1700	-0	25	1000	-0	320	72
77	3	SSN	671	687	-0	1700	-0	25	1000	-0	320	72
78	3	SSN	688	9999	-0	3700	-0	25	2000	-0	400	72
79	5	TAK	1	9999	-0	200	4100	95	2000	-0	520	55
80	5	AGEH	1	9999	-0	-0	-0	3	500	-0	220	99
81	5	MSC	1	9999	2	-0	400	3	500	-0	144	99
82	5	MSO	1	9999	2	-0	1400	3	1100	-0	190	99
83	5	PG	1	9999	-0	-0	1200	3	500	-0	165	99
84	5	PGH	1	9999	-0	-0	-0	3	500	-0	75	99

SHIP ASSIGNMENT

DATE	SHIP	TYPE	HULL	SHPCLS	OKCLS	PRITY	TYWK
3/ 1/74	1	CVA	39	29	20	16	RO
3/ 1/74	2	AO	111	2	35	16	RO
3/ 1/74	3	AO	222	2	35	16	RO
3/ 1/74	4	AO	332	2	35	16	RO
3/ 1/74	5	SSN	604	75	71	10	RF
3/ 1/74	6	SSN	7777	78	72	16	RO
3/ 1/74	7	SSN	668	76	72	10	RO
3/ 1/74	8	SSBN	610	73	72	4	RF
3/ 1/74	9	SSN	687	77	72	25	FO
3/ 1/74	10	DDG	2	50	75	22	RO
3/ 1/74	11	DDG	19	50	75	22	RO
3/ 1/74	12	DD	881	47	95	22	RO
3/ 1/74	13	DD	872	47	95	22	RO
3/ 1/74	14	SS	5555	72	98	16	RO
3/ 1/74	15	SS	6666	72	98	16	RO
3/ 1/74	16	SS	7777	72	98	16	RO
3/ 1/74	17	SS	487	72	98	16	RO
3/ 1/74	18	SS	1111	72	98	16	RO
3/ 1/74	19	SS	2222	72	98	16	RO
3/ 1/74	20	SS	333	72	98	16	RO
3/ 1/74	21	SS	4444	72	98	16	RO
3/ 1/74	22	SS	64	72	98	0	RU

BERTHING SUMMARY I.

SIMULATION DATE 3/ 1/74

BERTH LETTER	SHIPYARD IDENTITY		EPOWER AMP/450V	FWATER GPM	SWATER GPM	STEAM LBS/HR	LENGTH FT	NESTED FT
J	C/S							
		AVAIL	1400	200	1000	4000	1045	
		REQD	900	75	3000	0	700	350
		DIFF	500	133	-2000	4000	345	
I	O/N							
		AVAIL	4400	400	2800	6000	1068	
		REQD	3600	100	2500	14000	986	0
		DIFF	721	300	300	-8000	74	
H	O/S							
		AVAIL	4400	30	400	-0	1111	
		REQD	3600	300	3500	31700	899	0
		DIFF	800	-270	-3100	-31700	212	
G	F/N							
		AVAIL	6401	200	2000	7000	1200	
		REQD	5923	125	4500	11000	1180	0
		DIFF	490	75	-2500	-3800	20	
F	G/S							
		AVAIL	2800	130	3200	2000	450	
		REQD	1700	25	1000	0	320	0
		DIFF	1100	105	2200	2000	130	
E	G/N							
		AVAIL	4000	130	3200	2000	745	
		REQD	3450	50	2200	0	745	0
		DIFF	550	80	1000	2000	0	
D	H/N							
		AVAIL	4200	65	250	8000	650	
		REQD	2600	100	2500	20200	645	0
		DIFF	1600	-35	-2250	-12200	5	
C	H/S							
		AVAIL	4800	130	1300	2000	650	
		REQD	2600	100	2500	20200	645	0
		DIFF	2200	30	-1200	-18200	5	
B	J/N							
		AVAIL	2402	130	1500	7000	650	
		REQD	2600	100	2500	20200	645	0
		DIFF	-200	30	-1000	-13200	5	
A	J/S							
		AVAIL	2600	130	1500	7000	650	
		REQD	600	50	2000	0	350	350
		DIFF	2000	80	-500	7000	300	
U		REQD	2900	125	3	0	1720	0
TOTAL		AVAIL	37400	1553	17150	45000	8211	
		REQD	27650	1025	26200	116300	7115	700
		DIFF	9750	528	-9050	-71300	1096	

BERTHING SUMMARY II.

SHIPS BERTH

TYPE	HULL	TYWK	BERTH	
SSN	668	RO	F	
CVA	39	RO	H	
AO	222	RO	D	
AO	332	RO	C	
SSN	684	RF	E	
SSN	7777	RO	G	
AO	111	RO	B	
SSBN	618	RF	E	
DDG	2	RO	I	
DDG	19	RO		
DD	881	RO	G	
DD	872	RO		
SS	5555	RO	J	
SS	6666	RO		
SS	7777	RO	A	
SS	687	RO	J	*
SS	1111	RO	A	*

(* SHIP NESTED)

REQUIREMENTS FOR SHIPS NOT BERTHED			REASON FOR FAILURE
TYPE	HULL	TYWK	
SSN	687	FO	INSUFFICIENT POWER
SS	2222	RO	INSUFFICIENT SPACE
SS	333	RO	INSUFFICIENT SPACE
SS	4444	RO	INSUFFICIENT SPACE
SS	64	RU	INSUFFICIENT SPACE

80-02-03 TEST 041172 CHASN

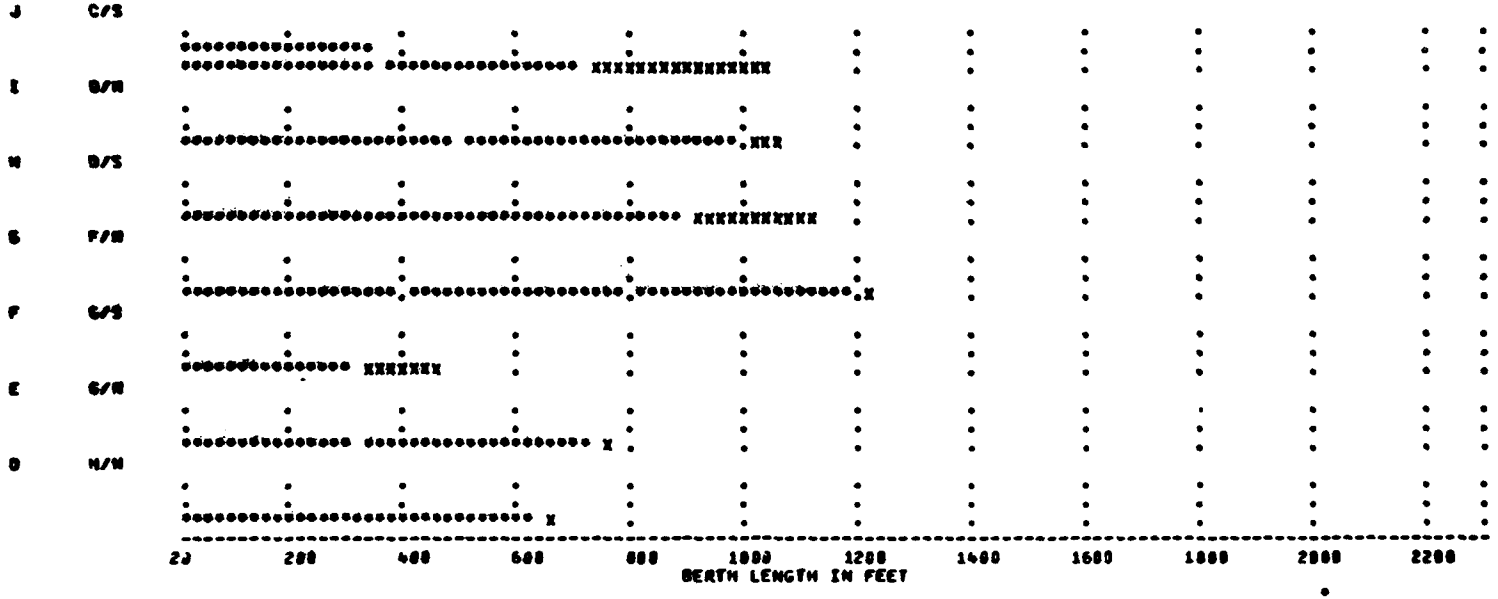
POWER STATION	REQD	AVAIL
1	8180	7650
2	13550	15600

80-03-03 TEST 041172 CHASN

BERTHING ASSIGNMENT SIMULATION

BERTH LETTER | SHIPYARD IDENTITY

SHIP UTILIZATION CHART — SIMULATION DATE 3/ 1/74



(X=OPEN,*=1 SHIP,*=NESTED SHIPS)

BERTH ASSIGNMENT LISTING

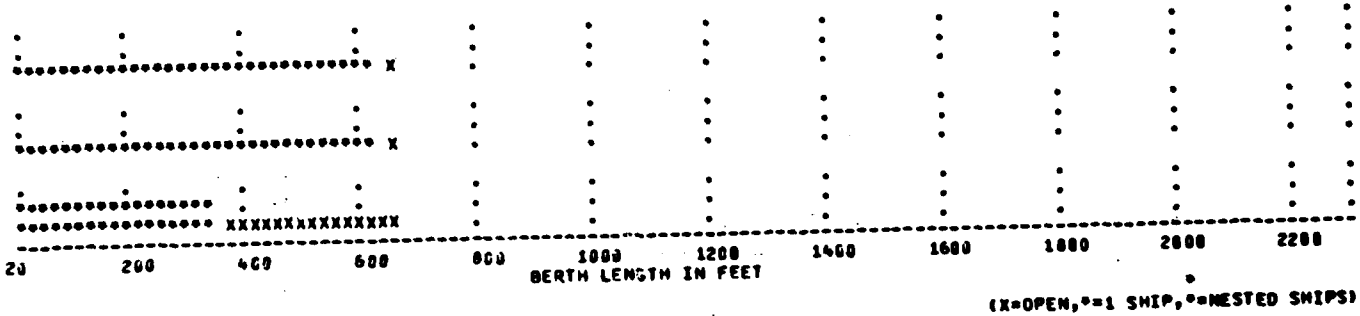
J	SS 5555+SS	407,SS 6666	
I	DDG 2,DDG	19	
H	CVA 39		
G	SSN 7777,00	881,00	872
F	SSN 668		
E	SSN 684,SSBN	618	
D	AO 222		

CHASN

58-03-03 TEST 841172

BERTHING ASSIGNMENT SIMULATION

SHIP UTILIZATION CHART SIMULATION DATE 3/ 1/74



(X=OPEN,*=1 SHIP,*=NESTED SHIPS)

BERTH ASSIGNMENT LISTING

C	AO	332
B	AO	111
A	SS	7777+SS 1111

SHIP BERTHING AUDIT-TRAIL

DATE	TYPE	HULL	PASS	BERTH	ACTION TAKEN
3/ 1/74	SSN	668	0	F	SHIP CAN BERTH,REMAINING SPACE= 138 POWER= 5100 NO.OF SHIPS IN BERTH= 1
3/ 1/74	CVA	39	0	H	SHIP CAN BERTH,REMAINING SPACE= 212 POWER= 5200 NO.OF SHIPS IN BERTH= 1
3/ 1/74	AD	222			
3/ 1/74	AD	332			
3/ 1/74	SSN	684	1	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 138 REQ= 828
			1	E	SHIP CAN BERTH,REMAINING SPACE= 425 POWER= 3350 NO.OF SHIPS IN BERTH= 1
3/ 1/74	SSN	7777	1	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 138 REQ= 488
			1	E	SHIP CANNOT BERTH,INSUFFIENT POWER. AVAIL= 3350 REQ= 3700
3/ 1/74	AD	111			
3/ 1/74	SSBN	618	1	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 138 REQ= 425
			1	E	SHIP CAN BERTH,REMAINING SPACE= 0 POWER= 1650 NO.OF SHIPS IN BERTH= 2
3/ 1/74	SSN	687	1	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 138 REQ= 328
			1	E	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 0 REQ= 328
3/ 1/74	DDG	2	1	I	SHIP CAN BERTH,REMAINING SPACE= 567 POWER= 3360 NO.OF SHIPS IN BERTH= 1
3/ 1/74	DDG	19	1	I	SHIP CAN BERTH,REMAINING SPACE= 74 POWER= 1520 NO.OF SHIPS IN BERTH= 2
3/ 1/74	DD	881	1	I	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 74 REQ= 398
			1	H	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 212 REQ= 398
			1	G	SHIP CAN BERTH,REMAINING SPACE= 818 POWER= 5298 NO.OF SHIPS IN BERTH= 1
3/ 1/74	DD	872	1	I	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 74 REQ= 398
			1	H	

```
                                                1  G
                                                     SHIP CAN BERTH,REMAINING SPACE=   428 POWER=  4188
                                                     NO.OF SHIPS IN BERTH=   2
3/ 1/74  SS    5555
                                                1  J
                                                     SHIP CAN BERTH,REMAINING SPACE=   695 POWER=  1188
                                                     NO.OF SHIPS IN BERTH=   1
3/ 1/74  SS    6666
                                                1  J
                                                     SHIP CAN BERTH,REMAINING SPACE=   345 POWER=   888
                                                     NO.OF SHIPS IN BERTH=   2
3/ 1/74  SS    7777
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  SS     687
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  SS    1111
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  SS    2222
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  SS     333
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  SS    4444
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  SS      64
                                                1  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
3/ 1/74  AD     222
                                                2  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   645
                                                2  I
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    74 REQ=   645
                                                2  H
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   212 REQ=   645
                                                2  G
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   428 REQ=   645
                                                     BERTH NOT ACCESSIBLE
                                                2  F
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   138 REQ=   645
                                                2  E
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     8 REQ=   645
                                                2  D
                                                     SHIP CAN BERTH,REMAINING SPACE=     5 POWER=  6488
                                                     NO.OF SHIPS IN BERTH=   1
3/ 1/74  AD     332
                                                2  J
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   645
                                                2  I
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    74 REQ=   645
                                                2  H
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   212 REQ=   645
                                                2  G
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   428 REQ=   645
                                                     BERTH NOT ACCESSIBLE
                                                2  F
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   138 REQ=   645
                                                2  E
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     8 REQ=   645
                                                2  D
                                                     SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     5 REQ=   645
```

```
                                                                  SHIP CAN BERTH,REMAINING SPACE=     5 POWER=  3888
                                                                  NO.OF SHIPS IN BERTH=   1

3/ 1/74  SSN   7777                                               SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   480
        2  J                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    74 REQ=   480
        2  I                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   212 REQ=   480
        2  H                                                      SHIP CAN BERTH,REMAINING SPACE=    20 POWER=   480
        2  G                                                      NO.OF SHIPS IN BERTH=   3

3/ 1/74  AO    111                                                SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   645
        2  J                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    74 REQ=   645
        2  I                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   212 REQ=   645
        2  H                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    20 REQ=   645
        2  G                                                      BERTH NOT ACCESSIBLE
        2  F                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   130 REQ=   645
        2  E                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     0 REQ=   645
        2  D                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     5 REQ=   645
        2  C                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     5 REQ=   645
        2  B                                                      SHIP CAN BERTH,REMAINING SPACE=     5 POWER=  2400
                                                                  NO.OF SHIPS IN BERTH=   1
3/ 1/74  SSN   687
        2  J                                                      SHIP CANNOT BERTH,INSUFFIENT POWER.   AVAIL=   888 REQ=  1788
        2  I                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    74 REQ=   320
        2  H                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   212 REQ=   320
        2  G                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    20 REQ=   320
        2  F                                                      BERTH NOT ACCESSIBLE
        2  E                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   130 REQ=   320
        2  D                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     5 REQ=   320
        2  C                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     5 REQ=   320
        2  B                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=     5 REQ=   320
        2  A                                                      SHIP CANNOT BERTH,INSUFFIENT POWER.   AVAIL=  2400 REQ=  1788
                                                                  POWER IS NOT ACCESSIBLE TO ENTIRE SHIP
3/ 1/74  SS    7777
        2  J                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   345 REQ=   350
        2  I                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    74 REQ=   350
        2  H                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=   212 REQ=   350
        2  G                                                      SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    20 REQ=   350
                                                                  BERTH NOT ACCESSIBLE
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```
                                                2  F
                                                2  E
                                                2  D
                                                2  C
                                                2  B
                                                2  A

                3/ 1/74  SS      487

                                                2  J
                                                2  I
                                                2  H
                                                2  G

                                                2  F
                                                2  E
                                                2  D
                                                2  C
                                                2  B
                                                2  A

                3/ 1/74  SS     1111

                                                2  J
                                                2  I
                                                2  H
                                                2  G

                                                2  F
                                                2  E
                                                2  D
                                                2  C
                                                2  B
                                                2  A

                3/ 1/74  SS     2222

                                                2  J
                                                2  I
                                                2  H
                                                2  G
```

```
SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   130 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     0 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CAN BERTH, REMAINING SPACE=   388 POWER=  2100
NO.OF SHIPS IN BERTH=   1

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   345 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=    74 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   212 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=    20 REQ=   350
BERTH NOT ACCESSIBLE

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   130 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     0 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   388 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   345 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=    74 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   212 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=    20 REQ=   350
BERTH NOT ACCESSIBLE

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   130 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     0 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=     5 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   388 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   345 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=    74 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=   212 REQ=   350

SHIP CANNOT BERTH, INSUFFICIENT SPACE  AVAIL=    20 REQ=   350
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				SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= [illegible] REQ= [illegible] BERTH NOT ACCESSIBLE
		2	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 133 REQ= 350
		2	E	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 0 REQ= 350
		2	D	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	C	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	B	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	A	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 300 REQ= 350
3/ 1/74 SS	333			
		2	J	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 345 REQ= 350
		2	I	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 74 REQ= 350
		2	H	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 212 REQ= 350
		2	G	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 28 REQ= 350 BERTH NOT ACCESSIBLE
		2	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 138 REQ= 350
		2	E	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 0 REQ= 350
		2	D	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	C	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	B	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	A	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 300 REQ= 350
3/ 1/74 SS	4444			
		2	J	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 345 REQ= 350
		2	I	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 74 REQ= 350
		2	H	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 212 REQ= 350
		2	G	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 23 REQ= 350 BERTH NOT ACCESSIBLE
		2	F	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 130 REQ= 350
		2	E	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 6 REQ= 350
		2	D	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	C	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	B	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 5 REQ= 350
		2	A	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 300 REQ= 350
3/ 1/74 SS	64			
		2	J	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 345 REQ= 350
		2	I	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 74 REQ= 350
		2	H	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= 212 REQ= 350
		2	G	SHIP CANNOT BERTH,INSUFFICIENT SPACE AVAIL= [illegible] REQ= [illegible]

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                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=  [illegible] REQ=   390
                                       BERTH NOT ACCESSIBLE
                          2  F
                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=  130 REQ=   390
                          2  E
                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    0 REQ=   390
                          2  D
                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    5 REQ=   390
                          2  C
                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    5 REQ=   390
                          2  B
                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=    5 REQ=   390
                          2  A
                                       SHIP CANNOT BERTH,INSUFFICIENT SPACE  AVAIL=  300 REQ=   390
3/ 1/74  SSN    667
3/ 1/74  SS     467
                          3  J
                                       NEST SHIP WITH SS    5955
                                       SHIP CAN BERTH,REMAINING SPACE=   345 POWER=   500
                                       NO.OF SHIPS IN BERTH=   3
3/ 1/74  SS    1111
                          3  J
                                       SHIP CANNOT BE NESTED
                          3  I
                                       SHIP CANNOT BE NESTED
                          3  H
                                       SHIP CANNOT BE NESTED
                          3  G
                                       SHIP CANNOT BE NESTED
                          3  F
                                       SHIP CANNOT BE NESTED
                          3  E
                                       SHIP CANNOT BE NESTED
                          3  D
                                       SHIP CANNOT BE NESTED
                          3  C
                                       SHIP CANNOT BE NESTED
                          3  B
                                       SHIP CANNOT BE NESTED
                          3  A
                                       NEST SHIP WITH SS    7777
                                       SHIP CAN BERTH,REMAINING SPACE=   300 POWER=  1000
                                       NO.OF SHIPS IN BERTH=   2
3/ 1/74  SS    2222
                          3  J
                                       SHIP CANNOT BE NESTED
                          3  I
                                       SHIP CANNOT BE NESTED
                          3  H
                                       SHIP CANNOT BE NESTED
                          3  G
                                       SHIP CANNOT BE NESTED
                          3  F
                                       SHIP CANNOT BE NESTED
                          3  E
                                       SHIP CANNOT BE NESTED
                          3  D
                                       SHIP CANNOT BE NESTED
                          3  C
                                       SHIP CANNOT BE NESTED
                          3  B
                                       SHIP CANNOT BE NESTED
                          3  A
                                       SHIP CANNOT BE NESTED
3/ 1/74  SS     333
                          3  J
                                       SHIP CANNOT BE NESTED
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```
                                                    3  I    SHIP CANNOT BE NESTED
                                                    3  H    SHIP CANNOT BE NESTED
                                                    3  G    SHIP CANNOT BE NESTED
                                                    3  F    SHIP CANNOT BE NESTED
                                                    3  E    SHIP CANNOT BE NESTED
                                                    3  D    SHIP CANNOT BE NESTED
                                                    3  C    SHIP CANNOT BE NESTED
                                                    3  B    SHIP CANNOT BE NESTED
                                                    3  A    SHIP CANNOT BE NESTED
3/ 1/74  SS     4444
                                                    3  J    SHIP CANNOT BE NESTED
                                                    3  I    SHIP CANNOT BE NESTED
                                                    3  H    SHIP CANNOT BE NESTED
                                                    3  G    SHIP CANNOT BE NESTED
                                                    3  F    SHIP CANNOT BE NESTED
                                                    3  E    SHIP CANNOT BE NESTED
                                                    3  D    SHIP CANNOT BE NESTED
                                                    3  C    SHIP CANNOT BE NESTED
                                                    3  B    SHIP CANNOT BE NESTED
                                                    3  A    SHIP CANNOT BE NESTED
3/ 1/74  SS       44
                                                    3  J    SHIP CANNOT BE NESTED
                                                    3  I    SHIP CANNOT BE NESTED
                                                    3  H    SHIP CANNOT BE NESTED
                                                    3  G    SHIP CANNOT BE NESTED
                                                    3  F    SHIP CANNOT BE NESTED
                                                    3  E    SHIP CANNOT BE NESTED
                                                    3  D    SHIP CANNOT BE NESTED
                                                    3  C    SHIP CANNOT BE NESTED
                                                    3  B    SHIP CANNOT BE NESTED
                                                    3  A    SHIP CANNOT BE NESTED
```

APPENDIX B - Glossary of Important Variables in BURF

FOR ICLASP (CLN,I)		
Variable	Position (I)	Description
CLN		Berth precedence number.
ICLASP (CLN,I)	1-15	Ship-type of ship to be considered as first-choice ship-type for the berthing precedence class number

FOR BERTH (BN,I)

Variable	Position (I)	Description
BN		Berth number
BLETTER	1	Program letter for berth
EPWR	2	Amount of electric current (ac at 450 volts) still available for use by other ships
STEAM	3	Steam (lb/hr)
FWTR	4	Fresh water (gpm)
SWTR	5	Salt water (gpm)
ADJ	6	Berth letter of adjacent berth
OPP	7	Berth letter of berth on opposite side of pier
BLT	8	Space remaining (ft)
CRANE	9	Not used (future use)
NSHIPS	10	Number of ships in berth

FOR NEST (NT,I)

Variable	Position (I)	Description
NT		Nesting type
TYPE1	1	Ship-type of nested ship
HULL1	2	Hull number, lower limit
HULU1	3	Hull number, upper limit
.	.	Information repeated for each ship-type that can be nested
.	.	
.	.	
.	.	
TYPE5	13	
HULL5	14	
HULU5	15	

FOR PIER (BN,I)

Variable	Position	Description
BN		Berth Number
BLETTER	1	Berth Letter
REPWR	2	Electric current requirement (ac at 450 volts) per foot of ship
CRANE	3	Not used
PIERD	4	Pier description
EPWR	5	Electric current (ac at 450 volts)
STEAM	6	Steam (lb/hr)
FWTR	7	Fresh water (gpm)
SWTR	8	Salt water (gpm)
ADJ	9	Berth letter of adjacent berth
OPP	10	Berth letter of on opposite side of pier
BLT	11	Length of berth (ft)
YDN	12	Shipyard name of berth

FOR PROB (SN,I)

Variable	Position	Description
*SN		Number corresponding to ship-type and hull number of ship for which maintenance probabilities are given for the ten-year interval considered.
PROB (SN,I)	1-10	Probability given between 0 and 1 for the ship SN requiring unscheduled maintenance during I year of the interval

*SN refers to the order in which the ship-type and class number of ship are input. See Unscheduled-work Probability Card, Section 4.2.3.9.

FOR PIERCL (CLN,I)

Variable	Position (I)	Description
CLN		Berthing precedence
PIERCL (CLN, I)	1-15	Program letter representation for berth identity.

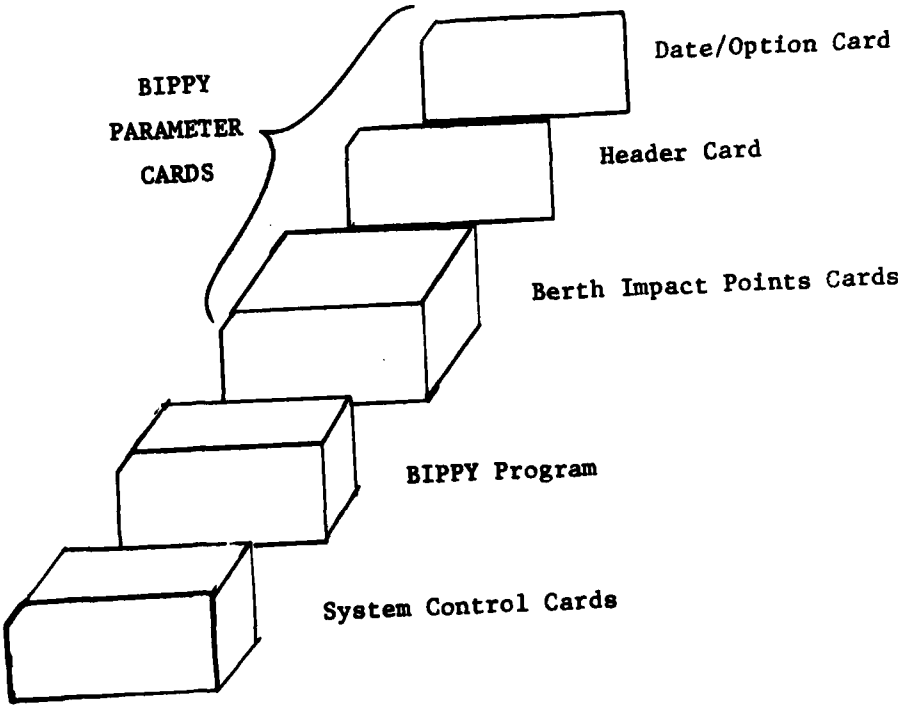
FOR SHPASG (PDN, SN, I)

Variable	Position (I)	Description
PDN		Period number, corresponds to berthing simulation date number
SN		Ship number of ship to be considered
TYPE	1	Ship-type name
HULL	2	Hull number
IMARK	3	System variable used for processing = 0, when not assigned to berth; indicates lack of space to berth ship = 1, indicates lack of electric current to berth = 2, if assigned berth, indicates skipping of steps in processing
BERTH	4	Berth letter of berth assigned to ship
SHPCLS	5	Ship berth preference class number
DKCLS	6	Ship class number
PRTY	7	Docking priority
TPWR	8	Type of work scheduled
NESTSH	9	Ship number of ship nested with this ship
NNEST	10	Total number of ships nested with this ship

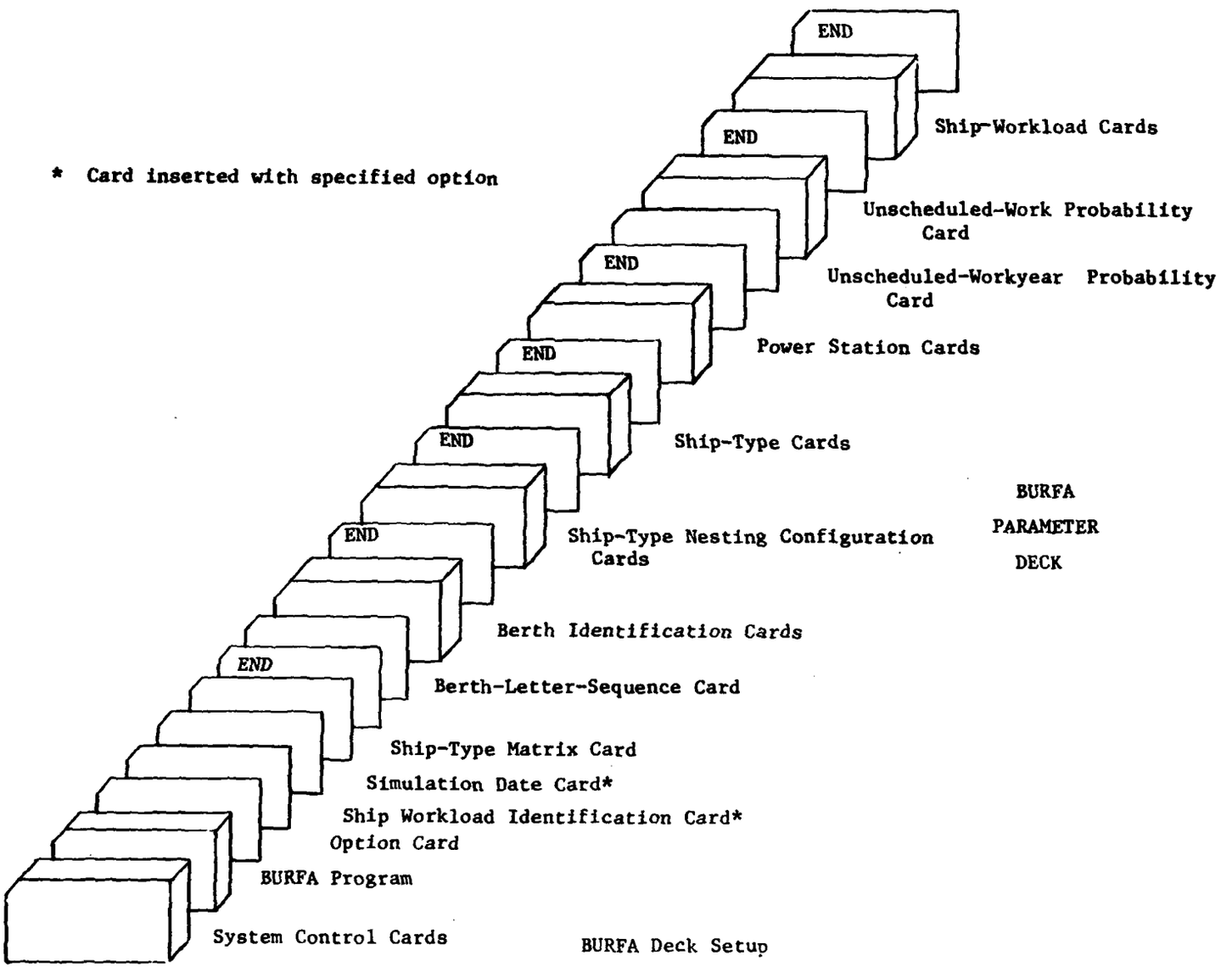
FOR SHPCLS (CLN,I)

Variable	Position (I)	Description
CLN		Ship class number
TYPE	1	Ship-type
HULU	2	Lower and upper limit of hull number, range
HULL	3	
NEST	4	Nesting indicator
EPWR	5	Electric current (ac at 450 volts)
STEAM	6	Steam (lb/hr)
FWTR	7	Fresh water (gpm)
SWTR	8	Salt water (gpm)
CRANE	9	Not used
LTSHIP	10	Length of ship (ft)
DKCLS	11	Ship class number
SHPCLS	12	Ship berthing preference class number

APPENDIX C - BURF Sample Deck Setup Diagrams

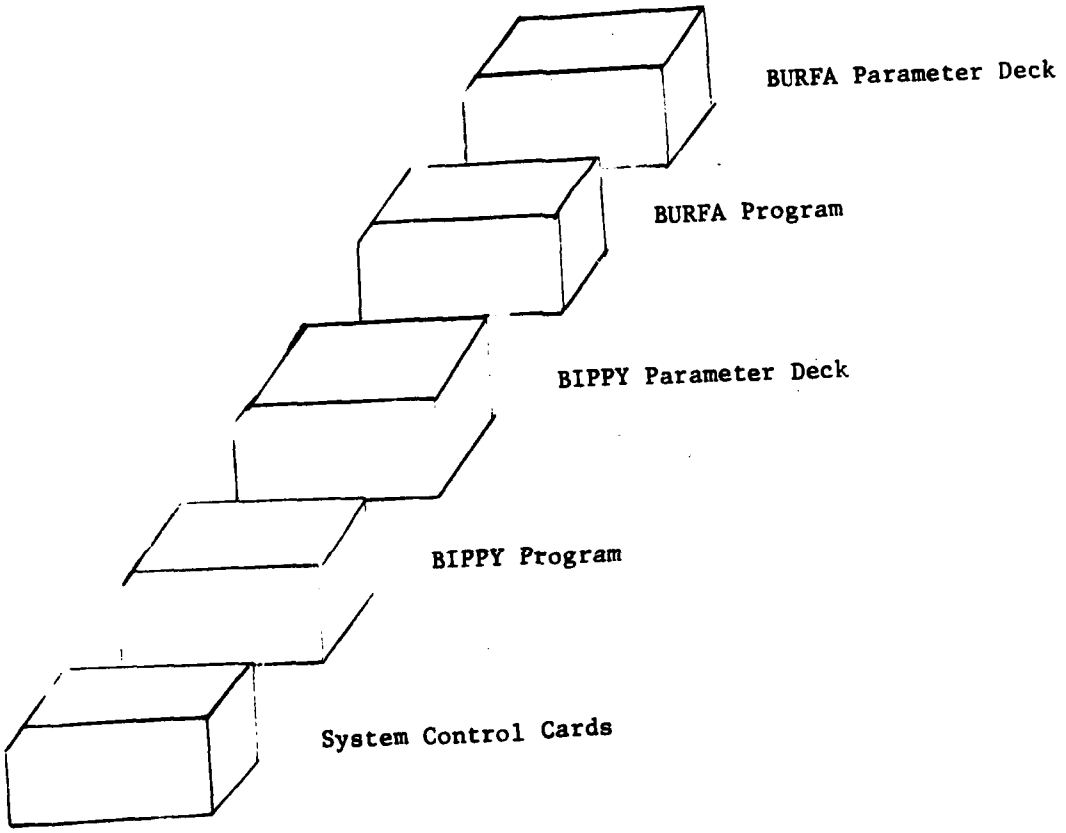


BIPPY Deck Setup



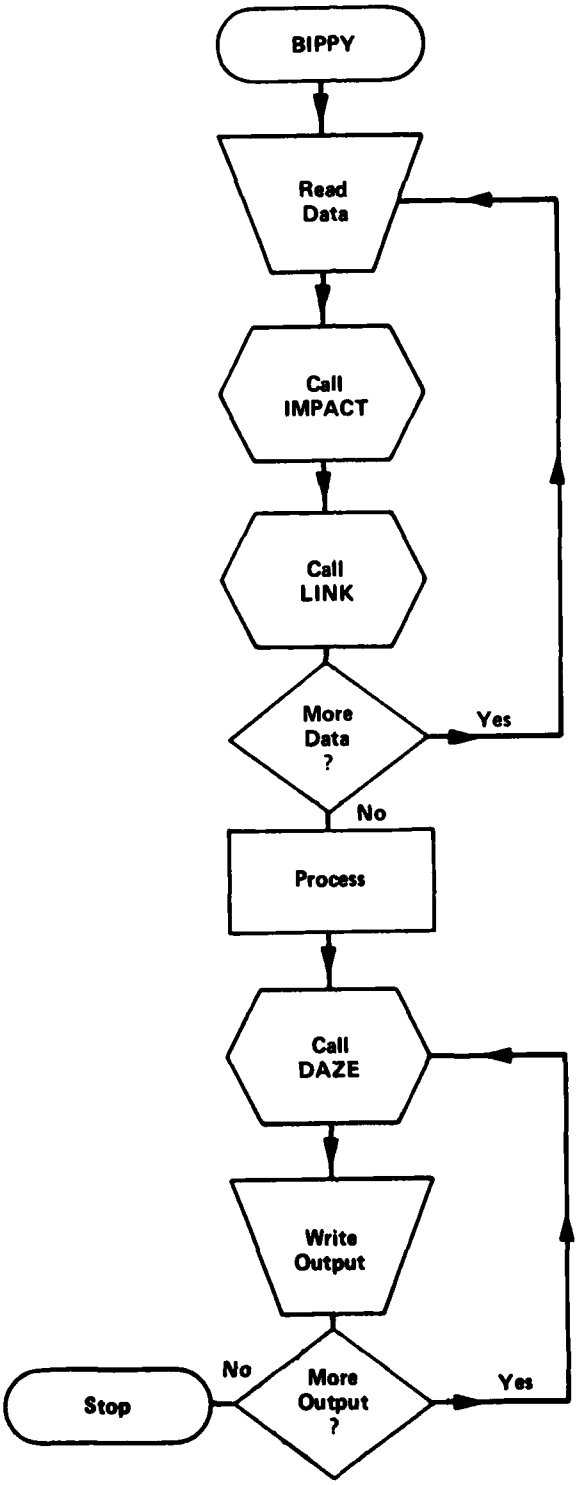
* Card inserted with specified option

BURFA Deck Setup

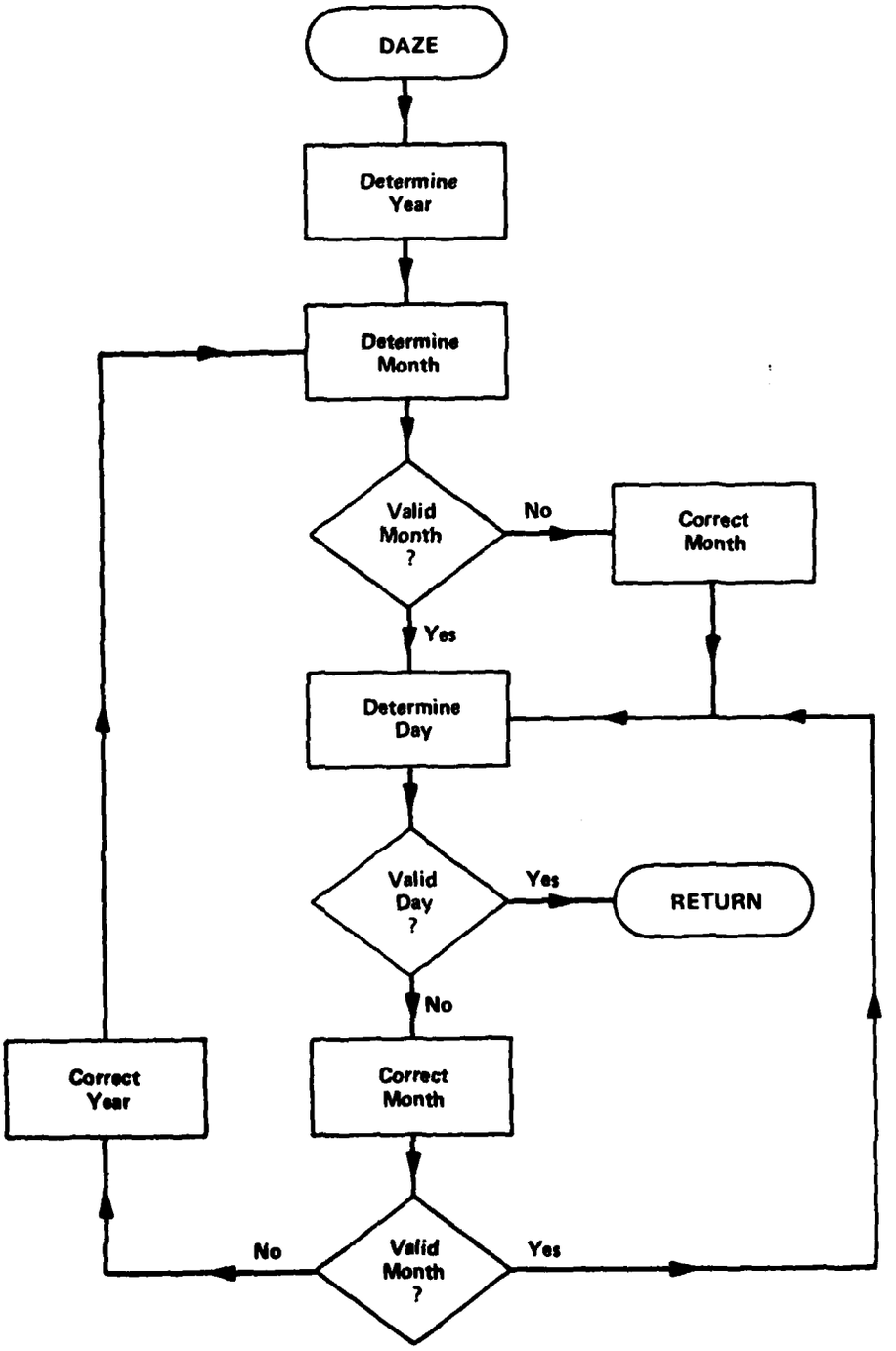


BIPPY/BURFA Deck Setup

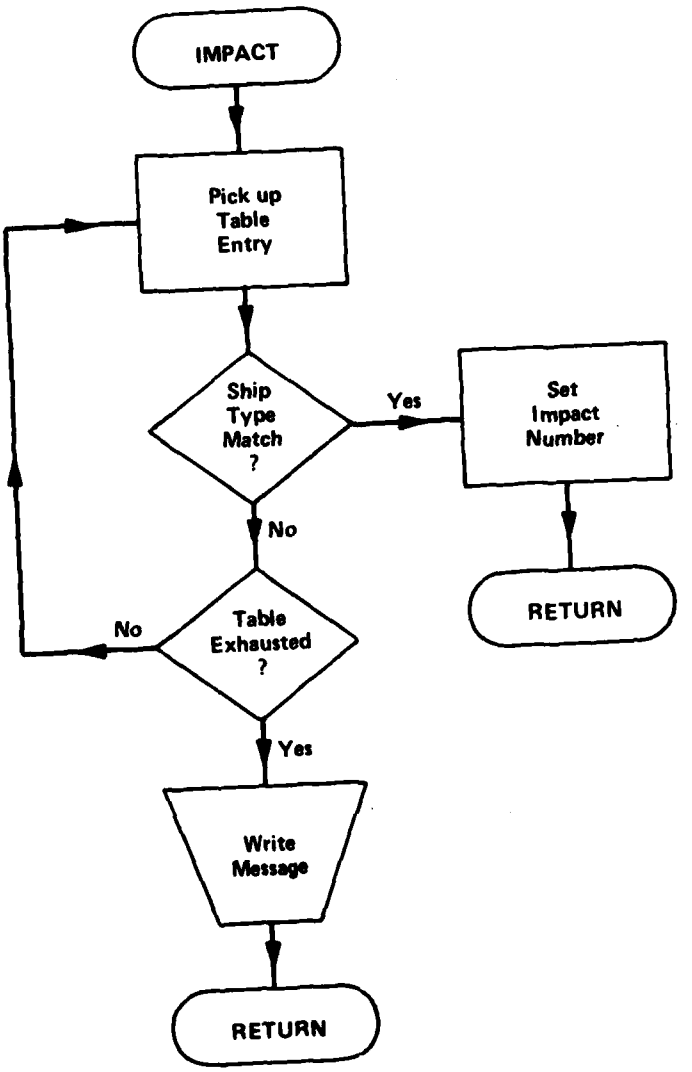
APPENDIX D - BURF Program Flow Charts



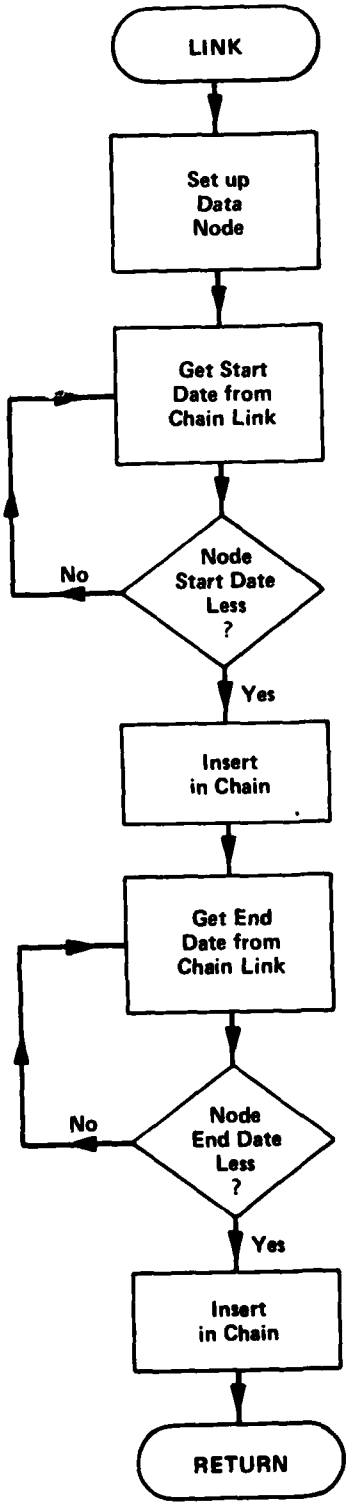
Flowchart for BIPPY



Flowchart for Subroutine DAZE



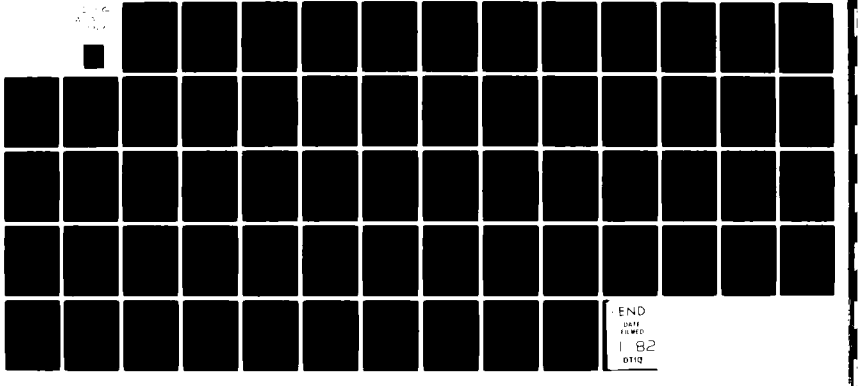
Flowchart for Subroutine IMPACT



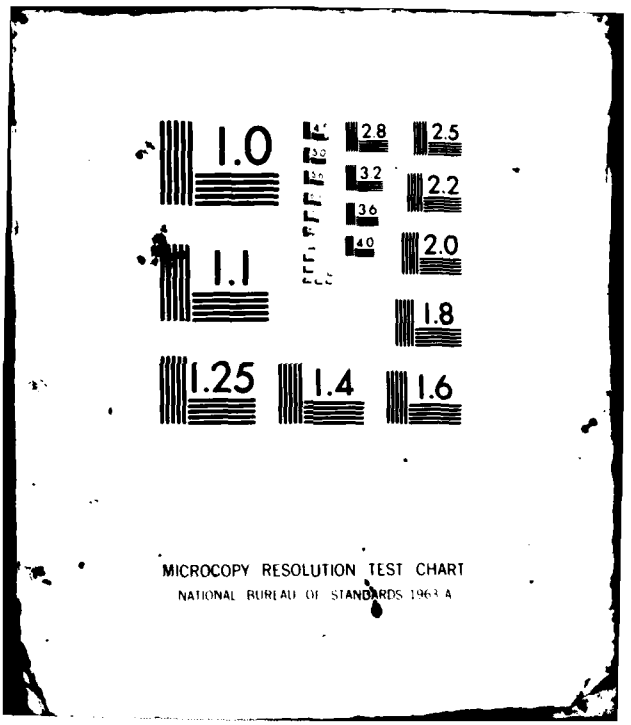
Flowchart for Subroutine LINK

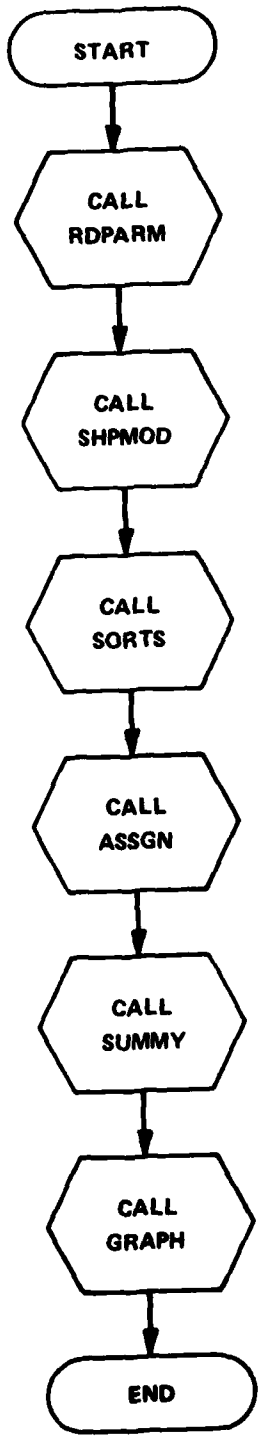
AD-A108 513 DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/G 15/5
BERTHING AND UTILITIES REQUIREMENTS FORECASTING (BURF) PROGRAM --ETC(U)
FEB 73 R E MELTON, D R HOEKZEMA

UNCLASSIFIED DTNSRDC-3999 NL

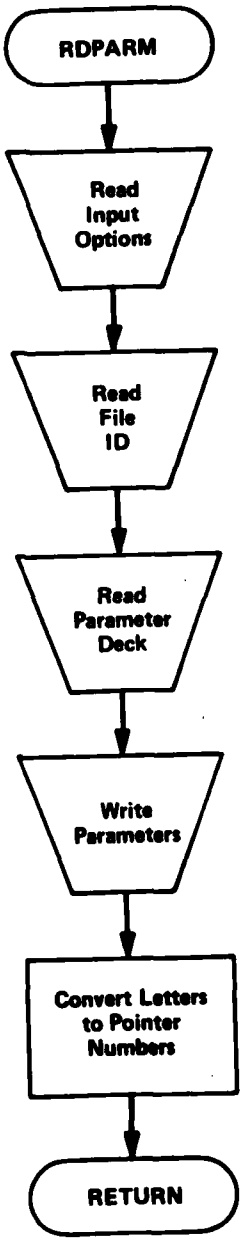


END
DATE FILMED
1 82
DTIC

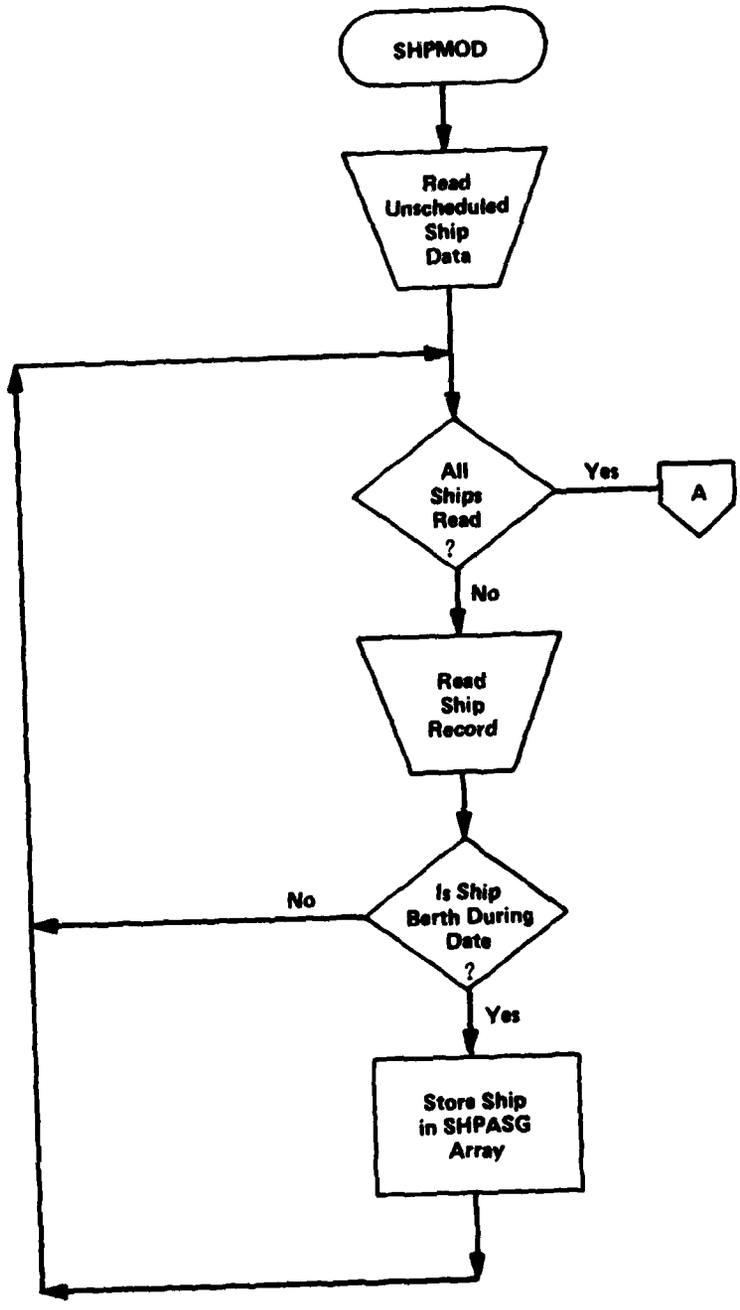

1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A



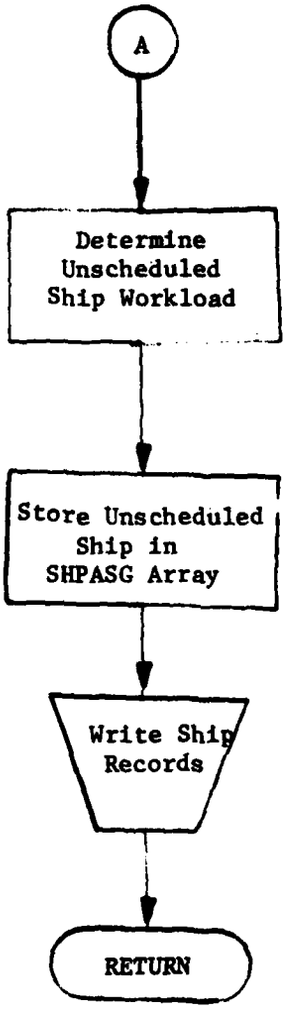
Flowchart for BURFA, Indicating Order of Calling Subroutines RDPARM, SHPMOD, SORTS, ASSGN, SUMMY and GRAPH



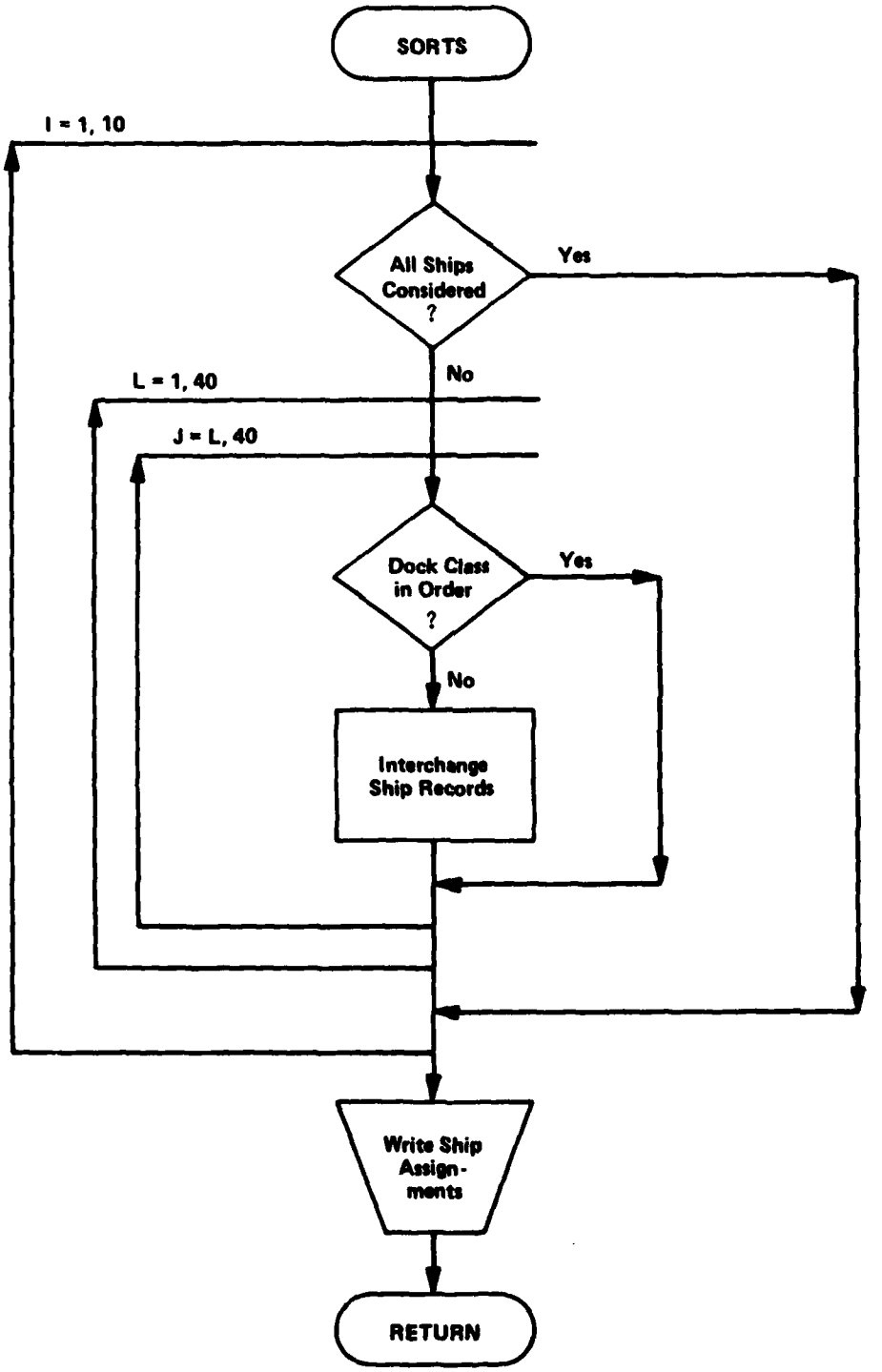
Flowchart for Subroutine RDPARM



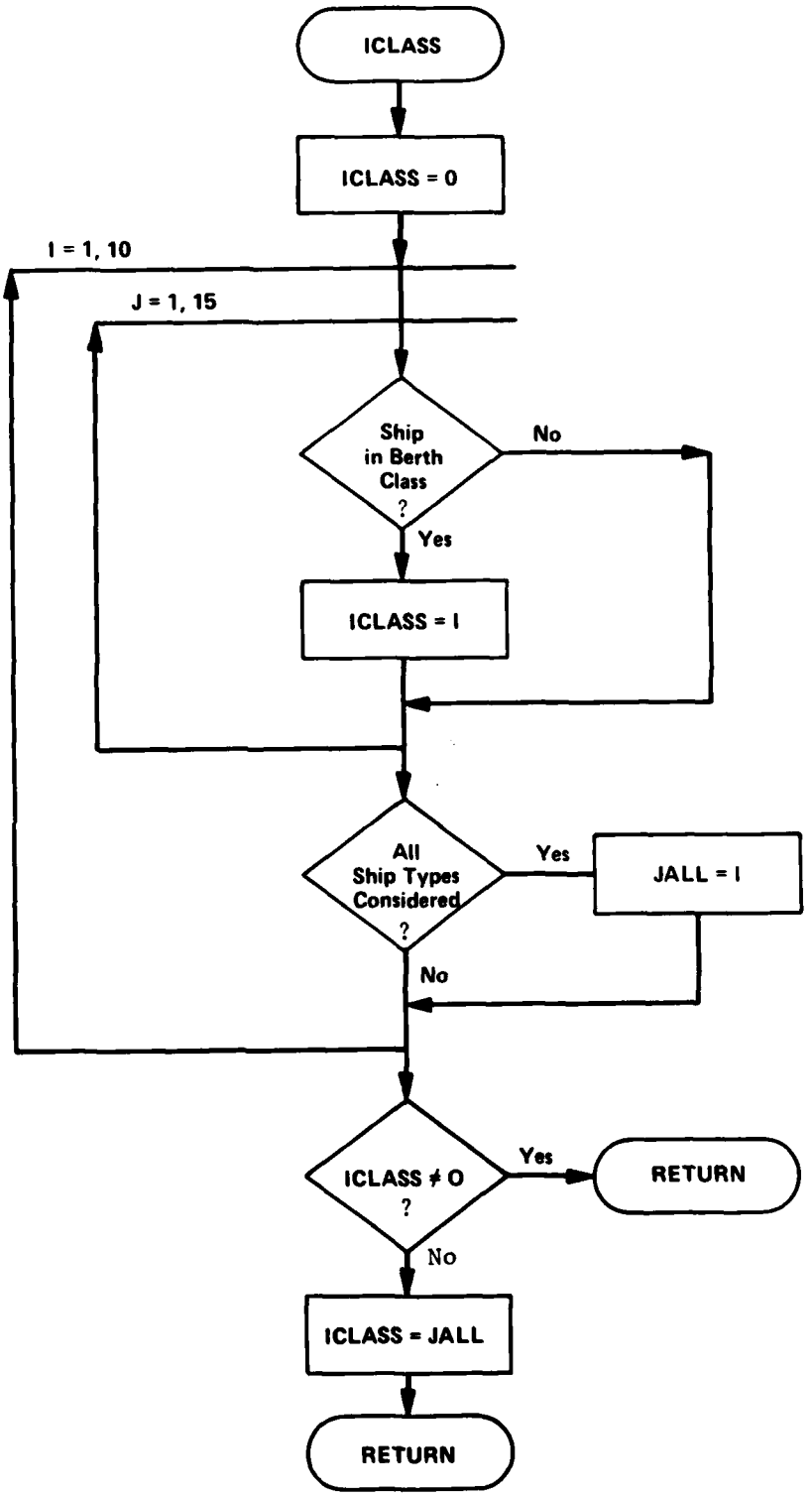
Flowchart for Subroutine SHPMOD



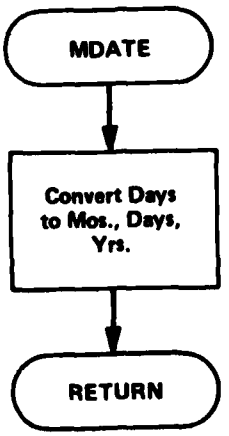
Flowchart for Subroutine SHPMOD (continued)



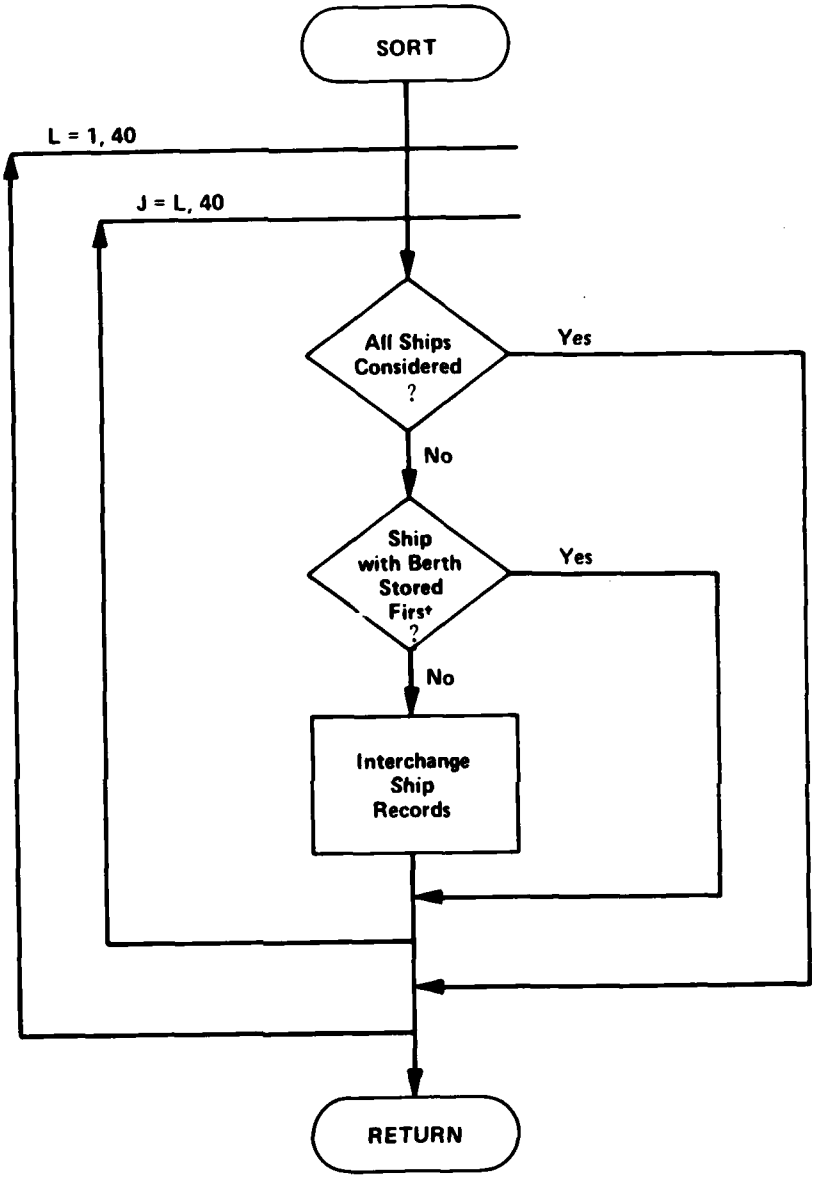
Flowchart for Subroutine SORTS



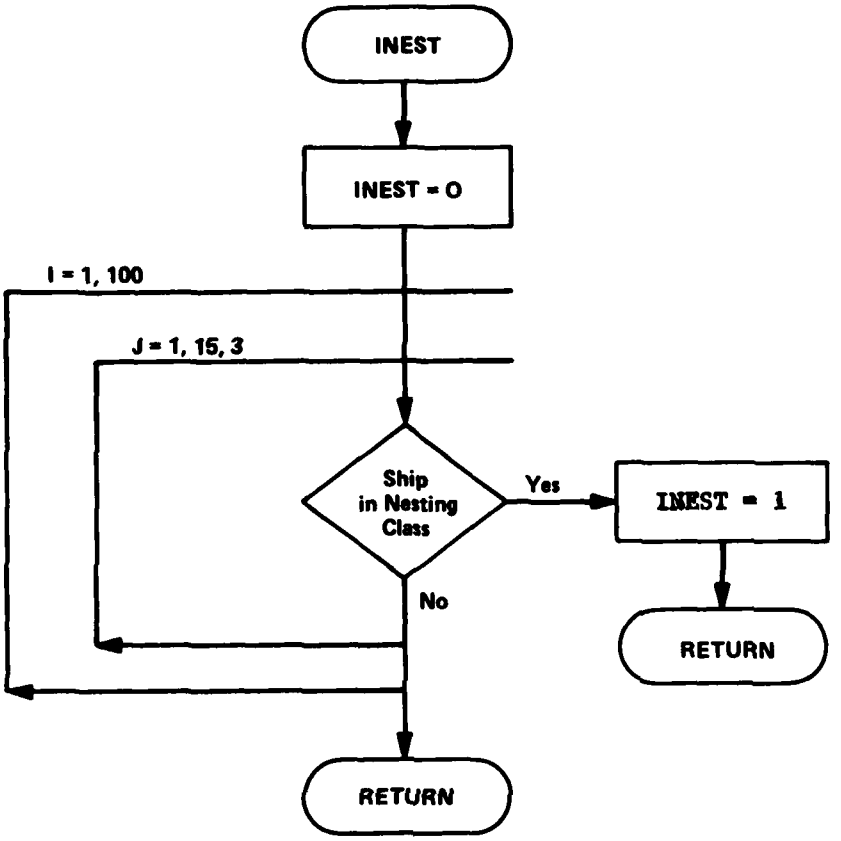
Flowchart for Function ICLASS



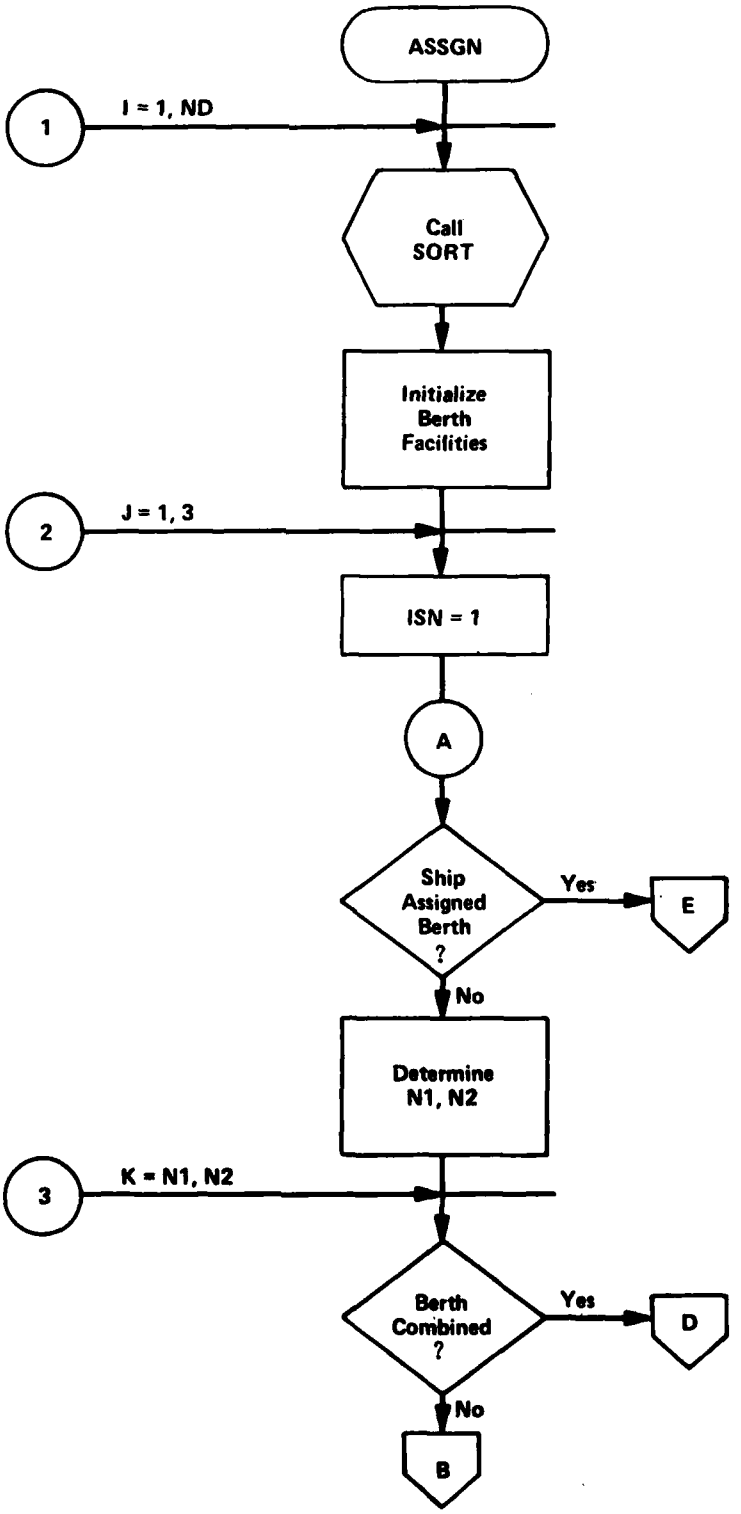
Flowchart for Function MDATE



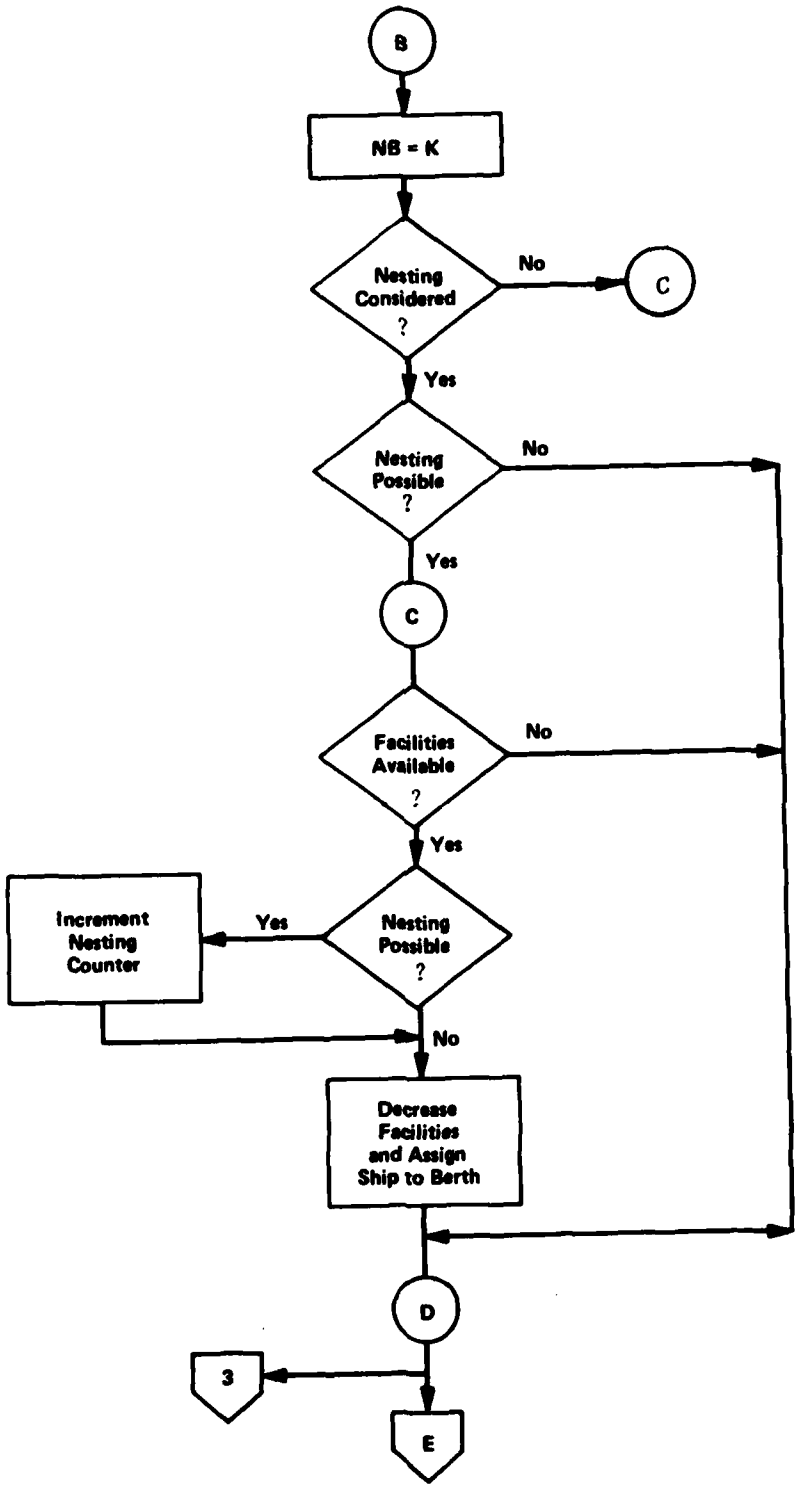
Flowchart for Subroutine SORT



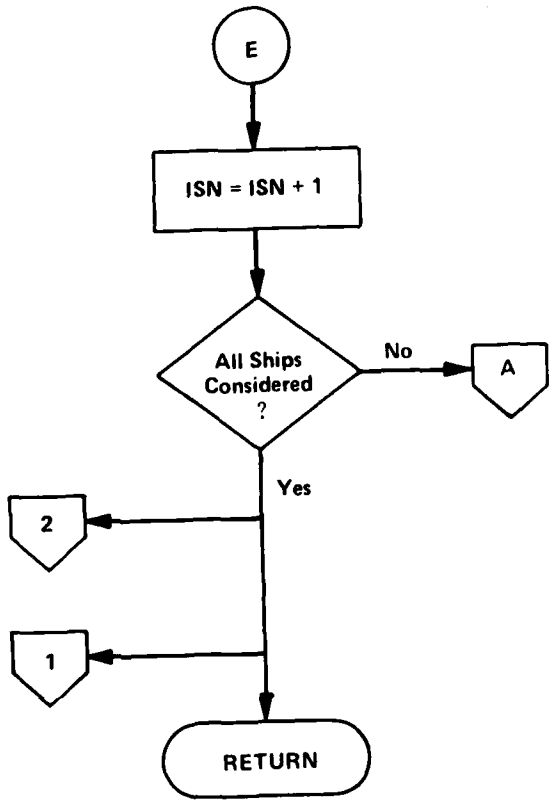
Flowchart for Function INEST



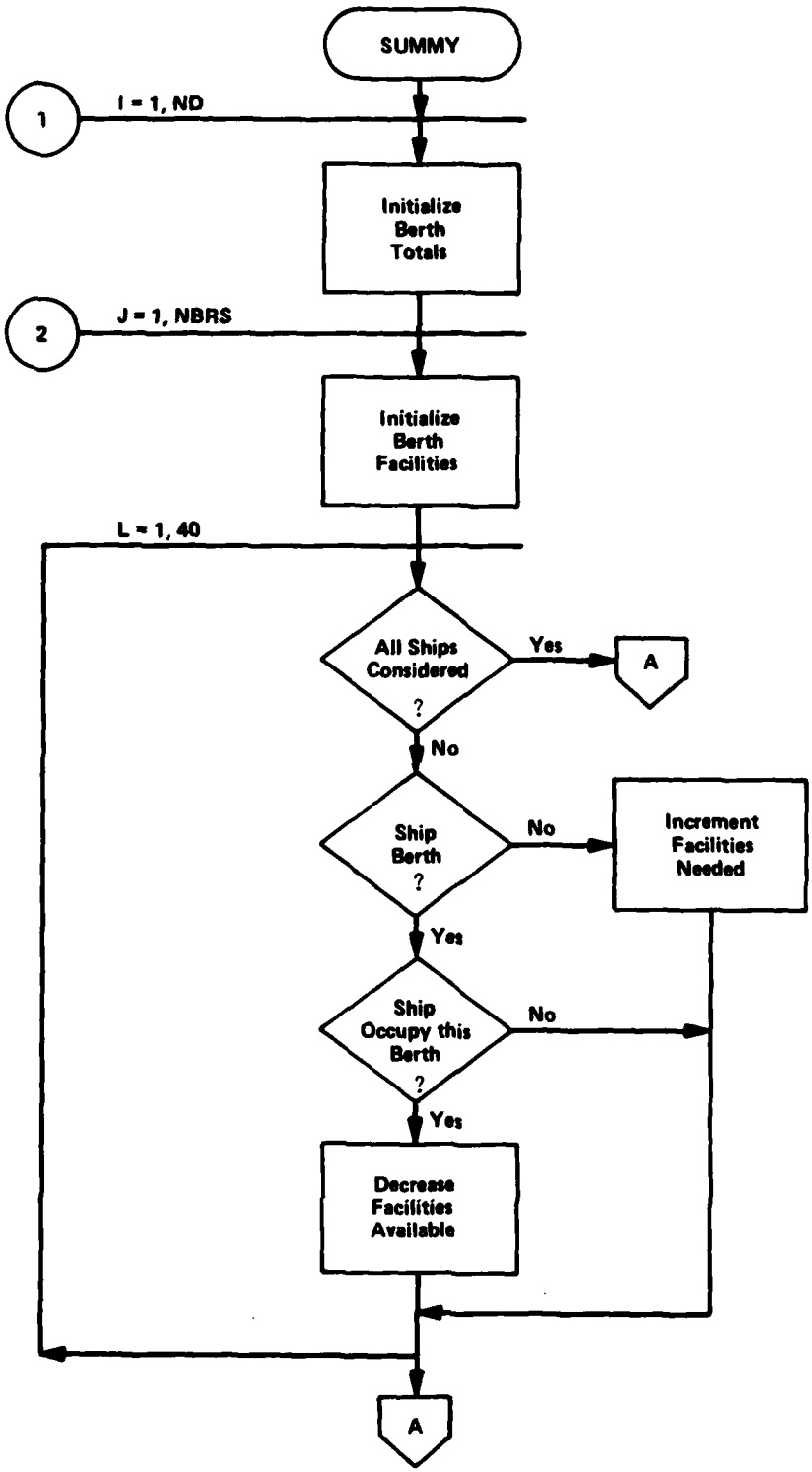
Flowchart for Subroutine ASSGN



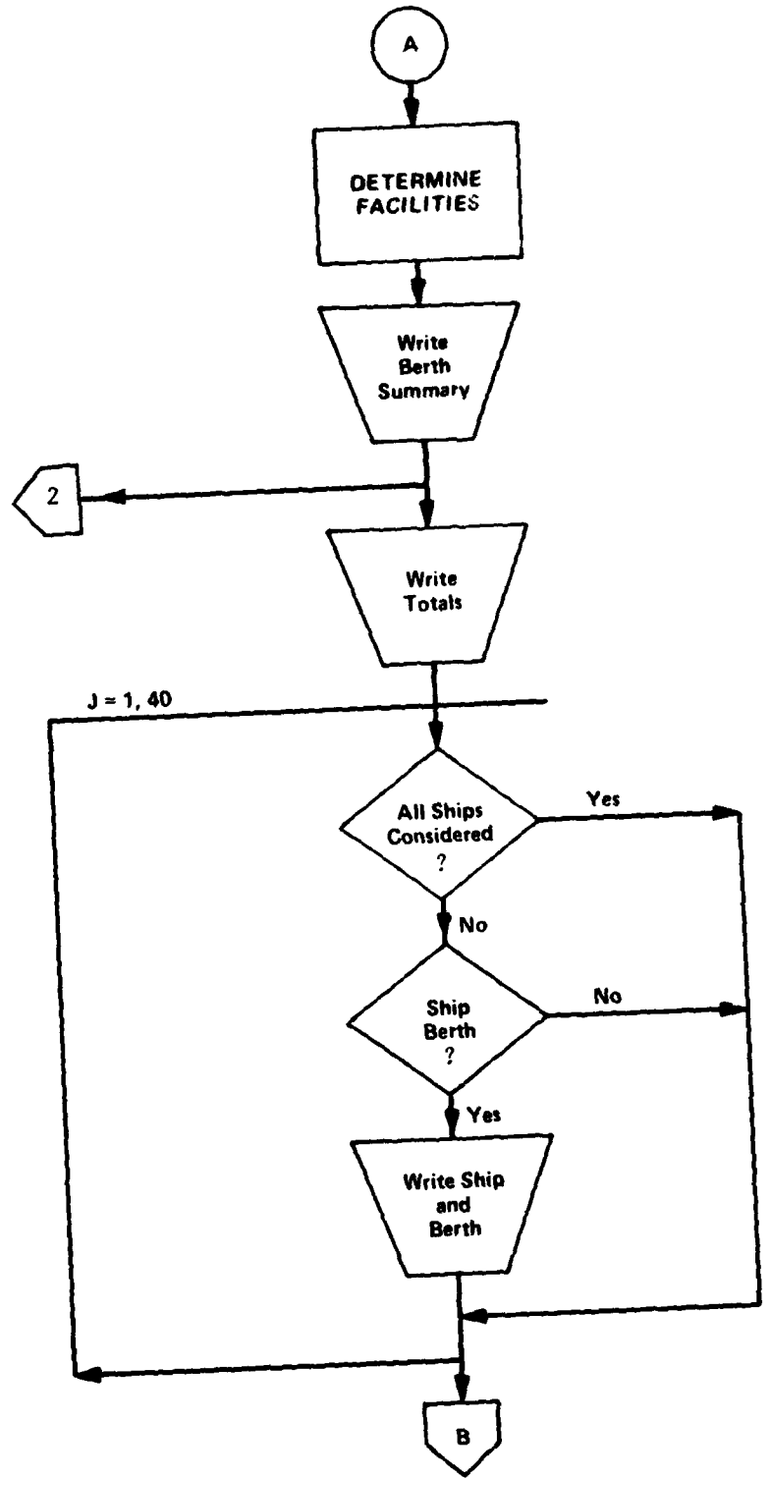
Flowchart for Subroutine ASSGN (continued)



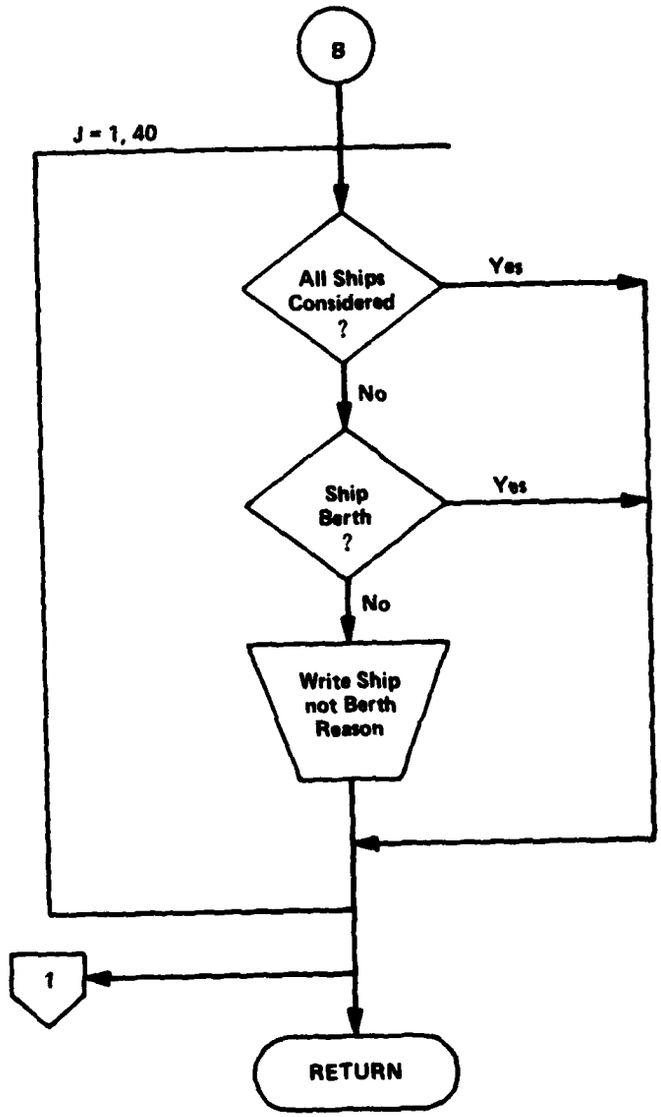
Flowchart for Subroutine ASSGN (continued)



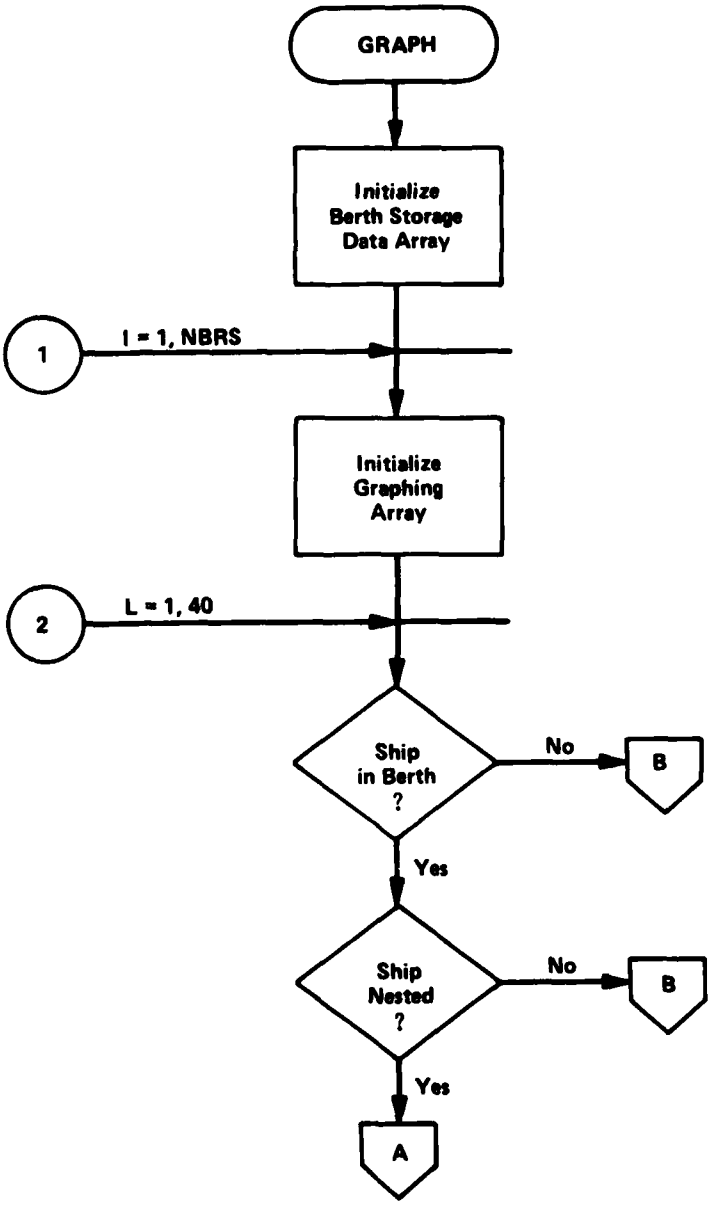
Flowchart for Subroutine SUMMY



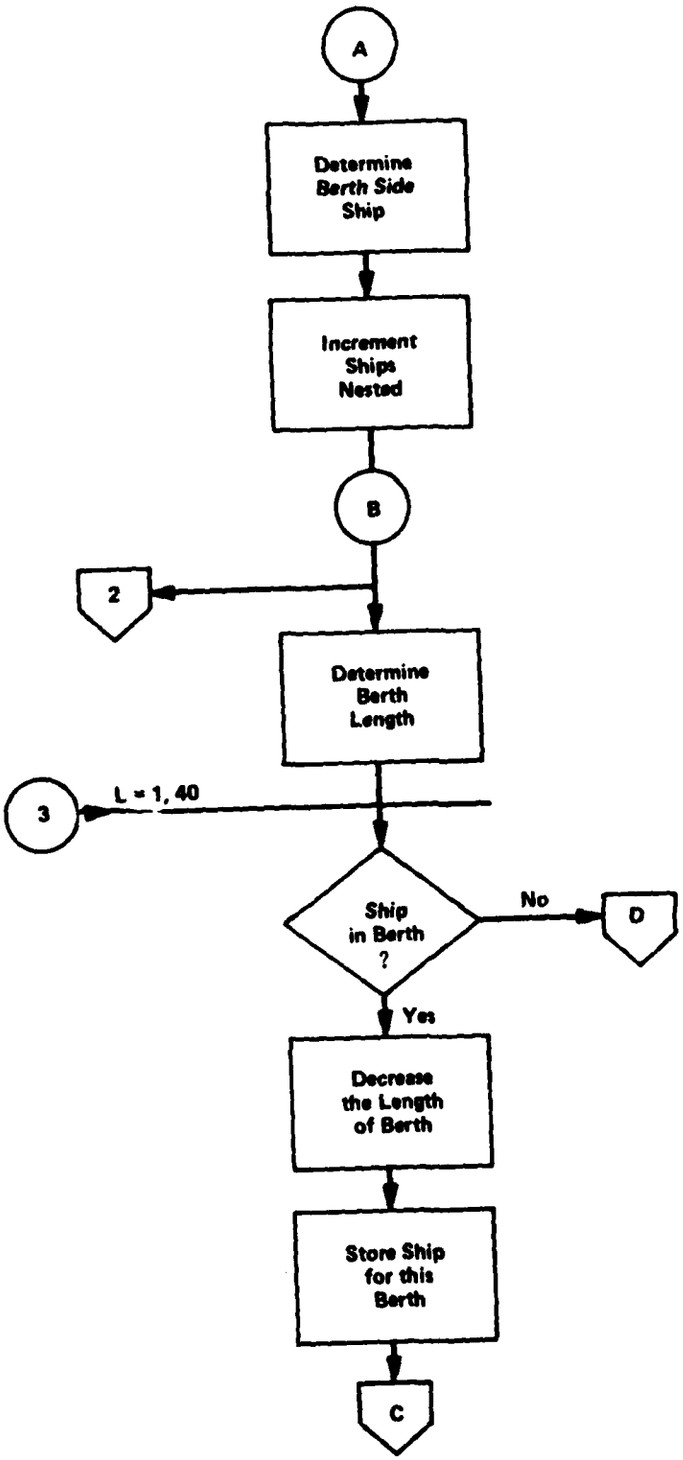
Flowchart for Subroutine SUMMY (continued)



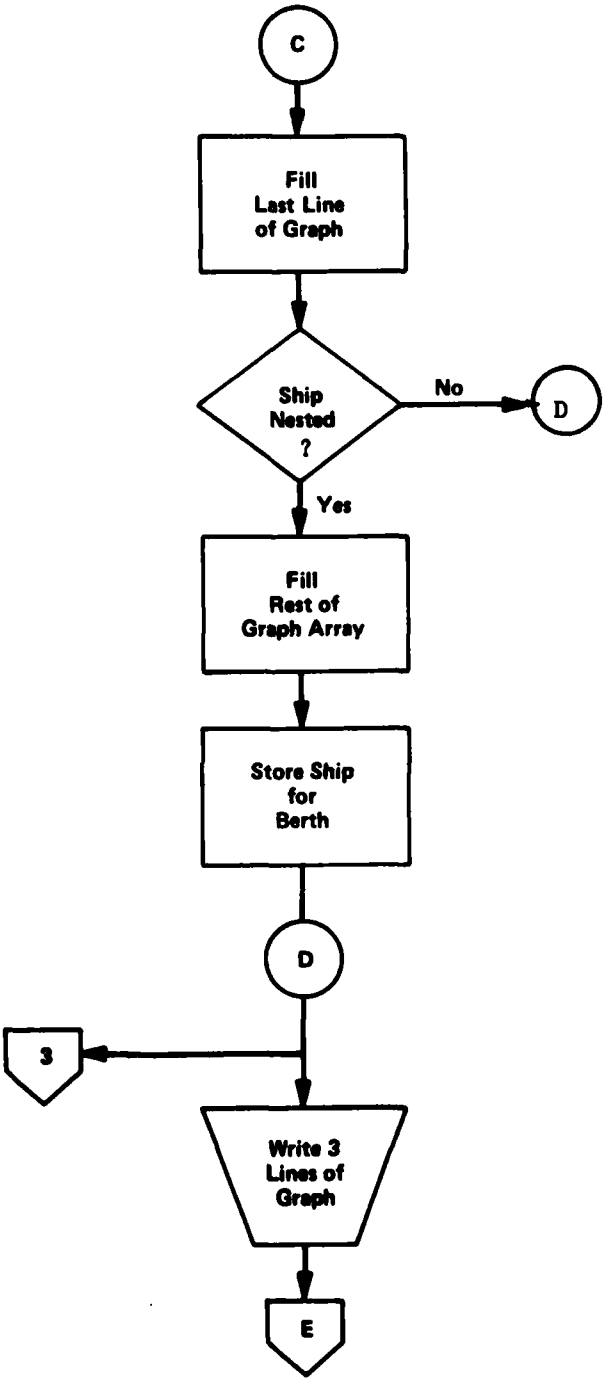
Flowchart for Subroutine SUMMY (continued)



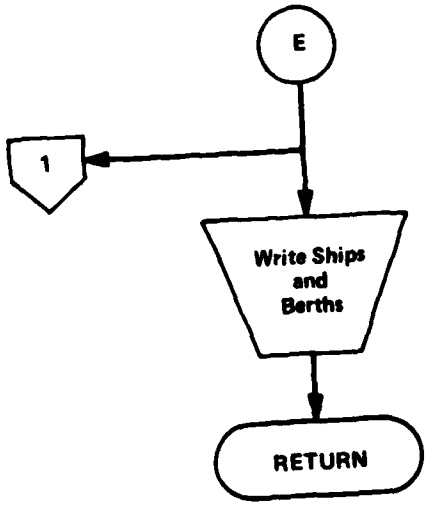
Flowchart for Subroutine GRAPH



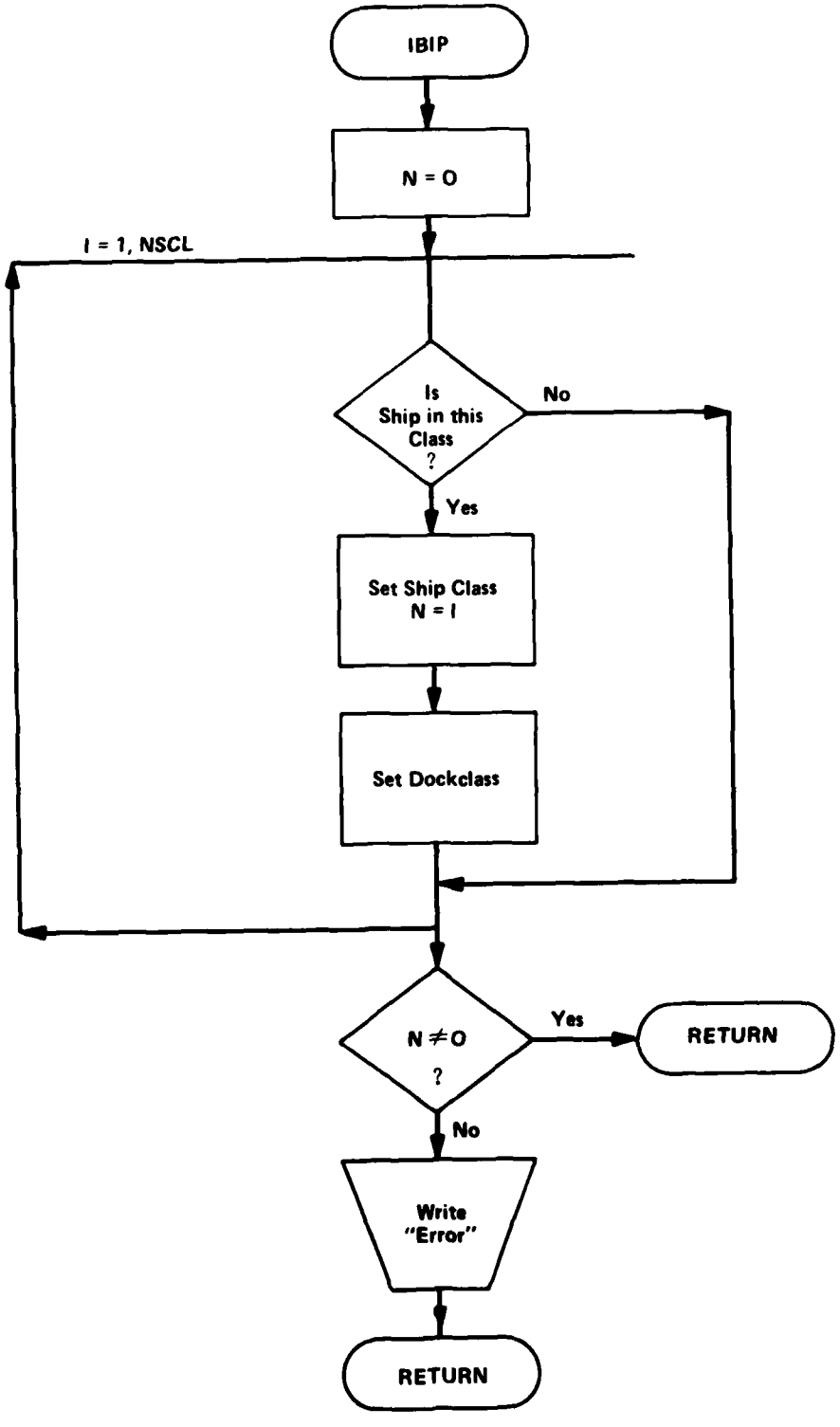
Flowchart for Subroutine GRAPH (continued)



Flowchart for Subroutine GRAPH (continued)



Flowchart for Subroutine GRAPH (continued)



Flowchart for Function IBIP

APPENDIX E - BURF Program Listings

```
      PROGRAM BIPPY(INPUT,OUTPUT,TAPE1,TAPE3,TAPE5=INPUT,TAPE6=OUTPUT)
C
C      BERTHING IMPACT POINTS PER YARD
C
C     PROGRAM BIPPY DETERMINES THE LOADING ON A SHIPYARDS UTILITIES BY
C     BERTHED SHIPS.  IT USES BERTHING IMPACT POINTS TO APPROXIMATE THIS
C     LOADING.  THE LOADING, AS A FUNCTION OF DATE, IS THE OUTPUT OF
C     THE PROGRAM.
      COMMON /DAZ/ ICF(12)
      COMMON /INP/ SH(88),NBL(88),NBU(88),B(88)
      COMMON /LNK/ I,SDT(1000),S(1000),EDT(1000),E(1000),BP(1000)
      INTEGER BIP,BP,SDT,S,EDT,E,B,SP,EP,DATE,NIDAT,NIPT,RAV
      DIMENSIONOUT(102),IN(8),IOT(21),NIDAT(10),NIPT(10),RAV(10),NDY(10)
      DATA (ICF(I),I=1,12) /0,1,-1,0,0,1,1,2,3,3,4,4/
      DATA BL,END  ,UNOS,UDOK,AST,4,0,P /3H   ,3HEND  ,3HUNOS ,3HUDOK ,
     13H***,1HX,1H.,1H+/
    1 FORMAT (A5,3I5)
    2 FORMAT (6(I2,1X),I7,3I5)
    3 FORMAT (A5,I4,5X,A3,3I2,2X,9I2,4X,I4)
    4 FORMAT (8A10)
    5 FORMAT (1H1,20X,8A10//7H0  DATE,6X,7HPOINTS ,21I5/)
    6 FORMAT (I3,1H/,I2,1H/,I2,I8,6X,102A1)
    7 FORMAT (1H1)
    8 FORMAT (1H )
    9 FORMAT (1H ,I2,1H/,I2,1H/,I2,I7)
   10 FORMAT (45H1THE PEAK DAYS BASED ON RUNNING AVERAGES OVER,I5,
     16H DAYS.//7H0  DATE,6X,7HPOINTS )
   11 FORMAT (10I8)
   12 FORMAT (5X,3A4,10X,A5,2I1)
      I = 1
      S(1) = 0
      E(1) = 0
      SDT(1) = 0
      EDT(1) = 0
      J = 0
C     THE 100 CODING READS THE BERTHING IMPACT POINT TABLE, THE TITLE
C     CARD, AND THE PERIOD AND CUTOFF LEVEL PARAMETERS.
  100 J = J + 1
      READ (5,1) SH(J),NBL(J),NBU(J),B(J)
      IF (SH(J).NE.END) GO TO 100
      READ (5,4) (IN(N),N=1,8)
      READ (5,2) ISH,ISD,ISY,IEH,IED,IEY,NAVE,NDYS,IOUT,ICUT
      NAVE = NAVE - 1
      JDS = 30*(ISH-1) + ICF(ISH) + ISD + 365*ISY
      JDE = 30*(IEH-1) + ICF(IEH) + IED + 365*IEY
      WRITE (6,7)
C     THE 200 CODING READS THE SHIPYARD BERTHING PROJECTIONS.  IT CHECKS
C     FOR THOSE WITHIN THE SPECIFIED TIME FRAME AND SETS UP THE DATA
C     STRUCTURE LINKING START AND END DATES FOR EACH BERTHING.  UNOS
C     AND UDOK RECORDS ARE IGNORED.
      READ (1,12) V1,V2,VJ,YARD,N1,N2
  200 READ (1,3) SHIP,NO,DOCK,IM1,ID1,IY1,IM2,ID2,IY2,IM3,ID3,IY3,
     1IM4,ID4,IY4,IOT
      IF (SHIP.EQ.END) GO TO 300
      IF (SHIP.EQ.UNOS.OR.SHIP.EQ.UDOK) GO TO 200
```

```
      JD1 = 30*(IM1-1) + ICF(IM1) + ID1 + 365*IY1
      JD4 = 30*(IM4-1) + ICF(IM4) + ID4 + 365*IY4
      IF (JD1.GT.JDE.OR.JD4.LT.JDS) GO TO 200
C     DETERMINE THE BERTHING IMPACT POINTS.
60    CALL IMPACT (SHIP,NO,BIP)
      IF (BIP.LE.0) GO TO 200
      IF (IM2.NE.0) GO TO 250
      IF (DOCK.EQ.AST) GO TO 240
      JD1 = MAX0(JD1,JDS)
65    JD4 = MIN0(JD4,JDE+1)
      CALL LINK(JD1,JD4,BIP)
      GO TO 200
C     FUDGE IN DATES FOR SHIPS THAT COULD NOT BE DOCKED.
240   KT = (JD4 - JD1 - IDT)/2
70    JD2 = JD1 + KT
      JD3 = JD4 - KT
      GO TO 251
250   JD2 = 30*(IM2-1) + ICF(IM2) + ID2 + 365*IY2
      JD3 = 30*(IM3-1) + ICF(IM3) + ID3 + 365*IY3
75    251 IF (JD2.LT.JDS) GO TO 260
      JD1 = MAX0(JD1,JDS)
      JD2 = MIN0(JD2,JDE+1)
      CALL LINK(JD1,JD2,BIP)
260   IF (JD3.GT.JDE) GO TO 200
80    JD3 = MAX0(JD3,JDS)
      JD4 = MIN0(JD4,JDE+1)
      CALL LINK(JD3,JD4,BIP)
      GO TO 200
C     THE 300 CODING PASSES THROUGH THE LINKED BERTH DATES KEEPING A
85    C     A RUNNING TOTAL OF IMPACT POINTS AT ANY TIME.   THIS TOTAL IS
C     AVERAGED OVER NAVE DAYS.  A BERTHING PERIOD IS A SERIES OF ONE
C     OR MORE DAYS DURING WHICH NO SHIP IS BERTHED OR UNBERTHED.
C     ONLY ONE PEAK DAY IS REPORTED FOR ANY BERTHING PERIOD.
300   IF (IOUT.NE.1) GO TO 310
90    IOT(1) = ICUT
      DO 305 N = 2,21
305   IOT(N) = IOT(N-1) + 5
      WRITE (6,5) (IN(N),N=1,8),(IOT(N),N=1,21)
310   LOAD = 0
95    ITOT = 0
      KTOT = 0
      DO 315 N = 1,10
      RAV(N) = 0
      NIDAT(N) = 0
100   315 NIPT(N) = 0
      SP = S(1)
      EP = E(1)
      DATE = JDS - 1
      LDT = DATE
105   C     STEP TO NEXT DAY
320   DATE = DATE + 1
      IF (DATE.GT.JDE) GO TO 350
C     ADD IN ADDITIONAL IMPACT POINTS TO TOTAL LOAD.
325   IF (SP.EQ.0) GO TO 330
110   IF (SDT(SP).GT.DATE) GO TO 330
```

```
                      LOAD = LOAD + BP(SP)
                      SP = S(SP)
                      GO TO 325
                C     SUBTRACT DELETED IMPACT POINTS FROM TOTAL LOAD.
  115           330   IF (EP.EQ.0) GO TO 350
                      IF (EDT(EP).GT.DATE) GO TO 350
                      LOAD = LOAD - BP(EP)
                      EP = E(EP)
                      GO TO 330
  120           350   IF (IOUT.NE.1) GO TO 370
                      IF (LOAD.LT.ICUT) GO TO 370
                C     CREATE AND WRITE OUTPUT LINE.
                      IF (LDT+1.NE.DATE) WRITE (6,8)
                      LDT = DATE
  125                 CALL DAZE (DATE,LM,LD,LY)
                      NN = 4
                      DO 355 N = 1,101
                      OUT(N) = BL
                      NN = NN + 1
  130                 IF (NN.NE.5) GO TO 354
                      OUT(N) = D
                      NN = 0
                354   IF (N.LE.(LOAD-ICUT+1)) OUT(N) = A
                355   CONTINUE
  135                 OUT(102) = BL
                      IF ((LOAD-ICUT).GT.100) OUT(102) = P
                      WRITE (6,6) LM,LD,LY,LOAD,(OUT(N),N=1,102)
                C     FIND THE RUNNING AVERAGE OVER NAVE DAYS.
                370   LTOT = KTOT
  140                 KTOT = ITOT
                      ITOT = 0
                      IF (NAVE.LE.0) GO TO 352
                      DO 351 N = 1,NAVE
                      RAV(N) = RAV(N+1)
  145           351   ITOT = ITOT + RAV(N)
                352   RAV(NAVE) = LOAD
                      ITOT = (ITOT + LOAD)/NAVE
                C     DETECT A PEAK BY A DROP IN THE TOTAL.
                      IF (ITOT.GE.KTOT.OR.KTOT.LT.LTOT) GO TO 320
  150           C     FIND LEAST STORED PEAK
                      K = 1
                      DO 361 N = 1,NDYS
                      IF (HIPT(N).LT.HIPT(K)) K = N
                361   CONTINUE
  155           C     IF THE NEW NODE IS IN THE TOP NDYS, INSERT IT.
                      IF (KTOT.LE.HIPT(K)) GO TO 320
                      HIDAT(K) = DATE - NAVE/2 - 1
                      HIPT(K) = KTOT
                      GO TO 320
  160           C     WRITE THE RESULTS
                380   WRITE (6,10) NAVE
                      DO 381 N = 1,NDYS
                      CALL DAZE(HIDAT(N),LM,LD,LY)
                381   WRITE (6,9) LM,LD,LY,HIPT(N)
  165                 WRITE (3,11) (HIDAT(N),N=1,10)
```

```
PROGRAM     BIPPY     TRACE                CDC 6600 FTN V3.0-P291 OPT=1  06/28/72  12.57.23.     PAGE     4
                      STOP
                      END
```

```
      SUBROUTINE DAZE(DATE,LM,LD,LY)
C     SUBROUTINE DAZE CONVERTS THE INTERNAL DATE REPRESENTATION TO
C     MONTHS, DAYS, AND YEARS.
      COMMON /DAZ/ ICF(12)
5     INTEGER DATE
      LY = DATE/365
2     LM = (DATE-365*LY)/30 + 1
      IF (LM.GE.13) LM = LM-1
5     LD = DATE - 365*LY - 30*(LM-1) - ICF(LM)
10    IF (LD.GT.0) RETURN
      LM = LM - 1
      IF (LM.GT.0) GO TO 5
      LY = LY - 1
      GO TO 2
15    END
```

```
      SUBROUTINE IMPACT(SHIP,NO,BIP)
C     SUBROUTINE IMPACT DOES A TABLE LOOKUP TO DETERMINE A SHIPS
C     BERTHING IMPACT POINTS.
      COMMON /IMP/ SN(80),NBL(80),NBU(80),B(80)
5     INTEGER BIP,B
      DO 100 I = 1,80
      IF (SHIP.NE.SN(I)) GO TO 100
      IF (NO.LT.NBL(I).OR.NO.GT.NBU(I)) GO TO 100
      BIP = B(I)
      RETURN
10    100 CONTINUE
      BIP = 0
      WRITE (6,1) SHIP,NO
    1 FORMAT (6HBSHIP ,A5,I4,29H HAS NO LISTED IMPACT POINTS.)
      RETURN
15    END
```

```
      SUBROUTINE LINK(SDATE,EDATE,BIP)
C     SUBROUTINE LINK TAKES A SINGLE BERTHING AND ADDS IT TO THE DATA
C     STRUCTURE.  START AND END DATES ARE EACH INDEPENTENTLY LINKED
C     IN ASCENDING CHAINS.
      COMMON /LNK/ I,SDT(1000),S(1000),EDT(1000),E(1000),BP(1000)
      INTEGER BIP,BP,SDATE,EDATE,SDT,S,EDT,E,SP,SPL,EP,EPL
      I = I + 1
      IF (I.LE.1000) GO TO 10
      WRITE (6,1)
    1 FORMAT (57H1THERE ARE OVER 1000 BERTHINGS, REDUCE THE TIME INTERVA
     1L.)
      STOP
C     STORE KNOWN DATA IN THE NEW NODE.
   10 BP(I) = BIP
      SDT(I) = SDATE
      EDT(I) = EDATE
      SPL = 1
      EPL = 1
      SP = S(1)
      EP = E(1)
C     LINK THE START DATE.
   90 IF (SP.EQ.0) GO TO 100
      IF (SDATE.LE.SDT(SP)) GO TO 100
      SPL = SP
      SP = S(SP)
      GO TO 90
  100 S(SPL) = I
      S(I) = SP
C     LINK THE END DATE.
  150 IF (EP.EQ.0) GO TO 200
      IF (EDATE.LE.EDT(EP)) GO TO 200
      EPL = EP
      EP = E(EP)
      GO TO 150
  200 E(EPL) = I
      E(I) = EP
      RETURN
      END
```

```
      OVERLAY(BURFA,0,0)
      PROGRAM BURFA(INPUT,OUTPUT,TAPE1,TAPE2,TAPE3,
     C TAPE5=INPUT,TAPE6=OUTPUT )
      CALL OVERLAY(SLBURFA,1,0)
      CALL OVERLAY(SLBURFA,2,0)
      CALL OVERLAY(SLBURFA,3,0)
      END
```

```
      BLOCK DATA
C-----------------------------------------------------------------------
C
C     INITIALIZE COMMON VARIABLES
C
C-----------------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),ND,IOPT,NY1,NY2
     C /POWER/ IPWR(10,10),NPS
     C /SHIP/ SHPASG(10,40,10) ,JALL
     C /SHIPC/ SHPCLS(100,12),NSCL
     C /PIERS/ PIER(100,12),NBRS
     C /BERTHS/ BERTH(100,10)
     C /PIERC/ PIERCL(10,15)      ,NPCL
     C /CLASP/ ICLASP(10,15)
     C /NESTS/ NEST(100,15)              ,NESTC(100,5)
      INTEGER SHPASG,PIER,BERTH,PIERCL,CLIP
       DATA IDATE,ND,SHPASG,SHPCLS,PIER,PIERCL,     ICLASP,NEST/8211*0/
        END
```

```
      SUBROUTINE DAZE(IDATE,LM,LD,LY)
C-----------------------------------------------------------------------
C
C     THIS ROUTINE CONVERTS DAYS TO MONTH,DAYS AND YEAR
C
C-----------------------------------------------------------------------
      DIMENSION ICF(12)
      DATA ICF/ 0,1,-1,0,0,1,1,2,3,3,4,4/
      LY=IDATE/365
    2 LM=(IDATE-365*LY)/30+1
      IF(LM.GE.13) LM=LM-1
    5 LD=IDATE-365*LY-30*(LM-1)-ICF(LM)
      IF(LD.GT.0) RETURN
      LM=LM-1
      IF(LM.GT.0) GO TO 5
      LY=LY-1
      GO TO 2
      END
```

```
      TRACE

      OVERLAY(BURFA,1,0)
       PROGRAM BAS1
      CALL RDPARM
      CALL SHPMOD
      CALL SORTS
       END
$
```

```
      SUBROUTINE RDPARP
C
C     THIS ROUTINE INPUTS ALL NECESSARY SHIP AND BERTH DATA  USED
C     FOR  THE SIMULATION . VERSION ,DATE AND INPUT OPTIONS ARE ALSO
C     READ.
C
C-----------------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),ND,IOPT,NY1,NY2
     C /POWER/ IPWR(10,10),NPS
     C /NESTS/ NEST(100,15)
     C /SHIPC/ SHPCLS(100,12),NSCL
     C /PIERS/ PIER(100,12),NBRS
     C /PIERC/ PIERCL(10,15)      ,NPCL
     C /CLASP/ ICLASP(10,15)
      INTEGER CLIP,SHPCLS,PIER,PIERCL
      DIMENSION JDATE(30)
       DATA JDATE/ 30*0/      ,IALL/ 5HALL  /
      DATA IEND,INULL,IBLNK/5HEND  ,5HNULL  ,5H      /
      REWIND 1
       REWIND 3
      READ(5,1002) IOPT       ,JOPT
       N=5
       IF(IOPT.GT.1) N=1
C
C     READ VERSION NAME AND DATE OF RUN
C
       READ(N,1000) (VERSN(I),I=1,3),YARD,NY1,NY2
 1000 FORMAT(5X,3A4,10X,A5,10X,2I1)
C
C     READ DATES OF SIMULATION
C
      IF(JOPT.GT.1) GO TO 13
      READ(5,1003) (JDATE(I),I=1,30)
 1003 FORMAT(10(I2,1X,I2,1X,I2))
      N=0
      DO 16 I=1,30,3
      IF(JDATE(I).LE.0) GO TO 14
      N=N+1
      IDATE(N)=NDATE(JDATE(I),JDATE(I+1),JDATE(I+2))
   16 CONTINUE
       GO TO 14
   13  READ(3,1001) (IDATE(I),I=1,10)
 1001 FORMAT(10I8)
C
C      CONVERT DATES TO DAYS AND STORE ASPERIODS IN IDATE ARRAY
   14  DO 11 I= 1,10
       IF(IDATE(I).LE.0) GO TO 11
       DO 12 J=I,10
        IF(IDATE(J).LE.0) GO TO 11
       IF(IDATE(I).LE.IDATE(J)) GO TO 12.
       ITEMP=IDATE(I)
       IDATE(I)=IDATE(J)
       IDATE(J)=ITEMP
   12 CONTINUE
```

```
      SUBROUTINE  RDPARM    TRACE                    CDC 6600 FTN V3.0-P291 OPT=1  06/28/72  13.11.24.      PAGE    4

                  11 CONTINUE
                     ND=1
                     DO 10 I=1,10
                     IF(IDATE(I).LE.0) GO TO 20
      60             ND=ND+1
                     CALL DAZE(IDATE(I),JDATE(ND),JDATE(ND+1),JDATE(ND+2))
                  10 ND=ND+3
                C
                C     READ NO. OF SHIPS (PIER CLASSES( AND NO. OF BERTHS IN YARD
      65        C
                1002 FORMAT(10X,I1,10X,I1)
                C
                C     READ BERTH FACILITIES DATA
                C
      70           20  DO 35 I=1,10
                       READ(5,1007) (ICLASP(I,J),J=1,15)
                1007 FORMAT( 15A5    )
                       IF(ICLASP(I,1).EQ.IEND) GO TO 45
                        READ(5,1009) (PIERCL(I,J),J=1,15)
      75        1009 FORMAT(15A3)
                  35 NPCL =I
                  45  NNB=0
                       ICLASP(NPCL+1,1)= IALL
                       DO 55 I=1,100
      80               READ(5,1006) (PIER(I,J),J=1,12)
                       IF(I.EQ.1) GO TO 54
                       IF(PIER(I,1).EQ.INULL) GO TO 54
                       IF(PIER(I,1).EQ.PIER(I-1,1) ) NNB=NNB+1
                1006 FORMAT(A5,F5.2,I3,A4,4I5,2A3,I5,A3)
      85          54  IF(PIER(I,1).EQ.IEND) GO TO 65
                  55 NBRS=I
                  65 NN=0
                        DO 150 I=1,100
                       READ(5,1010) (NEST(I,J),J=1,15)
      90               IF(NEST(I,1).EQ.IEND) GO TO 155
                 150 NN=I
                1610 FORMAT(5(A5,2I4))
                C
                C
      95        C     READ( SHIP CLASSES - FACILITIES USAGE DATA
                C
                 155  DO 15 I=1,100
                       READ(5,1004) (SHPCLS(I,J),J=1,11)
                1004 FORMAT(A5,2I4,I1,4I6,I2,I6,I3)
     100               IF(SHPCLS(I,1).EQ.IEND) GO TO 25
                   15 NSCL=I
                   25 NPS=0
                   26 NPS=NPS+1
                       READ(5,1026) (IPWR(NPS,I),I=1,10)
     105        1026 FORMAT(9A4,I5)
                       IF(IPWR(NPS,1).NE.IENC) GO TO 26
                       NPS=NPS-1
                C       PRINT PARAMETER SUMMARY
                C
     110               WRITE(6,2000) NV1,NV2, (VERSN(I),I=1,3),YARD
```

```
      2000 FORMAT(1H1,6H50-00-,2I1,5X,3A4,80X,A5, 8(//), 50X        ,
          F 22HBERTHING AND UTILITIES/ 51X,21HREQUIREMENTS FORECAST /
          F 57X, 7HPROGRAM )
            WRITE(6,2001) NY1,NY2,(VERSN(L),L=1,3),YARD,NSCL,NPCL,NBRS,NMB
  115 2001 FORMAT(1H1,6H50-10-,2I1,5X,3A4,80X,A5//5X
          F 28HNO.OF SHIP BERTHING CLASSES=,I3,32H,NO.OF BERTH PREFERENCE CLA
          FSSES=,I3,21H,NO.OF SINGLE BERTHS=,I3,30H,NO.OF COMBINED ACTIVE BER
          FTHS=,I3 ////)
            WRITE(6,2002) (JDATE(I),I=1,30    )
  120 2002 FORMAT(5X,   16HSIMULATION DATES /5X,16H---------- ---- /
          F 5X,10(I2,1H/,I2,1H/,I2,1X) ///)
            WRITE(6,2003)
            DO 110 I=1,NPCL
  110 WRITE( 6,2004) I,(PIERCL(I,J),J=1,15)
  125 2003 FORMAT(5X,36HBERTH PREFERENCE (1ST CHOICE) MATRIX /5X,6(6H------)/
          F 3X,10HPREFERENCE ,25X,16HPREFERENCE TABLE  /5X,5HGROUP,35X,
          F 15HBERTHS          ,11H FIRST PASS /5X,5H-----,3X,
          F 37H-------------------------------------- ,
          F 37H-------------------------------------- )
  130 2004 FORMAT(7X,I3,3X,15(A3,1X))
            WRITE(6,2009)
      2009 FORMAT(//5X,5HGROUP,35X,10HSHIP TYPES      /5X,5H-----,3X,
          F 37H-------------------------------------- ,
          F 37H-------------------------------------- )
  135       DO 115 I=1,NPCL
  115 WRITE(6,2010) I,(ICLASP(I,J),J=1,15)
      2010 FORMAT(5X,I5,3X,15(A5,1X))
            WRITE(6,2013)
            DO 125 I=1,NN
  140       IF(MOD(I,50).EQ.0) WRITE(6,2013)
  125 WRITE(6,2014) I,(NEST(I,J),J=1,15)
      2013 FORMAT(//5X,26HNESTING COMBINATION GROUPS /5X,4(5H-----),
          F 6H------ /5X,5HGROUP,5(5X,4HTYPE,5X,5HRANGE,3X)/
          F 5X,5H-----,5(5X,4H----,3X,9H---------,1X))
  145 2014 FORMAT(5X,I5,5(5X,A5,2X,I4,1X,I4,1X))
            WRITE(6,2015)
      2015 FORMAT(///1X,2H**,2X,63HEACH SHIP IN EACH GROUP CAN BE DOUBLE BERTH
          FED WITH ANY OTHER SHIP IN THE SAME GROUP  )
            WRITE(6,2016) NY1,NY2,(VERSN(L),L=1,3),YARD
  150 2016 FORMAT(1H1,6H50-11-,2I1,5X,3A4,80X,A5//)
            WRITE(6,2005)
      2005 FORMAT(5X,20HBERTH IDENTIFICATION ,15X,17HCAPABILITY TABLE  /
          F 5X,6H------,14H-------------- /
          F 5X,6HSEQ NO ,2X,7HPROGRAM,2X8HSHIPYARD ,2X,
  155     F 9HCRANE,2X,4HEPWR,2X,4HSTMP,2X,4HFWTR,2X,4HSWTR,2X,6HLENGTH,
          F 2X,3HADJ,2X,3HOPP/
          F5X,6H------,2X, 7H-------,2X, 8H--------  ,2X,5H-----,2X,
          F 4(4H----,2X),6H------,2(2X,3H---))
            DO 30 I=1,NBRS
  160       IF(MOD(I,50).EQ.0) WRITE(6,2005)
            IF(PIER(I,1).EQ.INULL) GO TO 30
             NBR=PIER(I,1)
            IF(I.EQ.1) GO TO 31
            IF(PIER(I,1).EQ.PIER(I-1,1)) NBR=IBLNK
  165   31 WRITE(6,2006)I,NBR,PIER(I,12),PIER(I,4),PIER(I,3),(PIER(I,J),J=5,8
```

```
     M ),PIER(I,11),PIER(I,9),PIER(I,10)
2036 FORMAT(5X,I6,2X,A7,2X,A4,1X,A4,2X,I5,1X,5(I5,1X),2X,2A5)
  30 CONTINUE
      WRITE(6,2016) NY1,NY2,(VERSN(L),L=1,3),YARD
      WRITE(6,2026)
2026 FORMAT(5X,28HPOWER STATION IDENTIFICATION/ 5X,28(1H-)//
    F 5X,13HPOWER STATION,22X,6HBERTHS,21X,4HAMPS/5X,13(1H-),2X
    F ,45(1H-),   2X,4H----)
      DO 37 J=1,NPS
  37 WRITE(6,2027) J,(IPWR(J,I),I=1,10)
2027 FORMAT(16X,I2,2X,9(A4,1X),2X,I5)
      DO 42 K=1,NBRS
       DO 52 I=1,NPCL
      DO 62 J=1,15
      IF(PIERCL(I,J).NE.PIER(K,1)) GO TO 62
       PIERCL(I,J)=K
      GO TO 52
  62 CONTINUE
  52 CONTINUE
      DO 72 I=1,NPS
      DO 82 J=1,9
      IF(IPWR(I,J).NE.PIER(K,1)) GO TO 82
      IPWR(I,J)=K
      GO TO 72
  82 CONTINUE
  72 CONTINUE
      DO 92 I=1,NBRS
      IF(PIER(I,9).EQ.PIER(K,1)) PIER(I,9)=K
       IF(PIER(I,10).EQ.PIER(K,1)) PIER(I,10)=K
      IF(PIER(I,9).EQ.IBLNK) PIER(I,9)=0
      IF(PIER(I,10).EQ.IBLNK) PIER(I,10)=0
  92 CONTINUE
  42 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE SHPMOD
C-----------------------------------------------------------------
C
C     THIS ROUTINE MODIFIES SHIPS RECORDS FOR THE SYSTEMS USE.
C     NECESSARY  SHIP PARAMETERS ARE ADDED TO THE SHIP RECORD.
C     THE ROUTINE ALSO  SIMULATES UNASSIGNED SHIP WORK BY THE USE
C     OF RANDOM SELECTION BASED ON SHIP MAINTENANCE PROBABILITIES.
C
C-----------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),NU,IOPT,NY1,NY2
     C /SHIP/ SHPASG(10,40,10) ,JALL
     C /SHIPC/ SHPCLS(100,12),NSCL
     C /PIERS/ PIER(100,12) ,NBRS
      DIMENSION PROB(40,10),SHUF(40),ISHUF(40)
       INTEGER SHPASG,CLIP,SHPCLS,SHPC(10),SDATE,EDATE,UDATE,DDATE,
     I SHP(25),SNO(40),SHIP(40),RA,YEAR(10)         ,PIER
       DATA IEND,NTAPE1,SHPC/5HEND  ,11*0/
      DATA RA /5HRU /  ,IUDK,IUN/5HUDOK ,5HUNOS /,IELNK/ 4H     /
C       IOPT=1, CARD INPUT ONLY
C       =2 TAPE1 INPUT ONLY
C         =3 TAPE1 AND CARD INPUT
      JP = 0
      OUN = 1.
      IDCL = 1
C     THE FOLLOWING READS UNSCHEDULED SHIP PROBABILITIES.
      READ (5,2005) (YEAR(I),I=1,10),MXSHP
 2005 FORMAT (10X,11I5)
       WRITE(6,2004) NY1,NY2,(VERSN(I),I=1,3),YARD
      WRITE (6,3000) (YEAR(I),I=1,10)
 3000 FORMAT(1//5X,29HUNASSIGNED WORK PROBABILITIES /5X,29(1H-)//5X,
     1 14HSHIP,4X,4HHULL,10(5X,I2) /5X,4H----,4X,4H----,10(2X,5H-----))
  110 JP = JP + 1
      READ (5,2001) SHIP(JP),SNO(JP),(PROB(JP,I),I=1,10)
 2001 FORMAT (A5,I5,10F5.2)
      WRITE (6,3001) SHIP(JP),SNO(JP),(PROB(JP,I),I=1,10)
 3001 FORMAT (5X,A4,4X,I4,10(2X,F5.2))
      IF (SHIP(JP).NE.IEND) GO TO 110
       WRITE(6,9999)
 9999 FORMAT(1H1)
      JP = JP - 1
   10 GO TO (20,30,40),IOPT
   20 READ(5,1000) (SHP(I),I=1,22)
 1000 FORMAT(A5,I4,A5,A3,3I2,A2,9I2,A2,2X,I4,A3,2I2)
        IF(SHP(1).EQ.IUDK.OR.SHP(1).EQ.IUN) GO TO 20
       IF(SHP(1).EQ.IEND)  GO TO 100
        GO TO 60
   30 READ(1,1000) (SHP(I),I=1,22)
        IF(SHP(1).EQ.IUDK.OR.SHP(1).EQ.IUN) GO TO 30
       IF(SHP(1).EQ.IEND) GO TO 100
       GO TO 60
   40 IF(NTAPE1.NE.0) GO TO 50
       READ(1,1000) (SHP(I),I=1,22)
        IF(SHP(1).EQ.IUDK.OR.SHP(1).EQ.IUN) GO TO 40
        IF(SHP(1).NE.IEND) GO TO 60
```

```
      NTAPE1  =1
   50 READ(5,1003) (SHP(I),I=1,22)
      IF(SHP(1).EQ.IUCH.OR.SHP(1).EQ.IUN) GO TO 50
      IF(SHP(1).EQ.IEND)  GO TO 100
C      CONVERT BERTHING AVAIL. DATES TO DAYS
   60 SDATE=MDATE(SHP(5),SHP(6),SHP(7))
      ODATE= MDATE(SHP(9),SHP(10),SHP(11))
      UDATE= MDATE(SHP(12),SHP(12),SHP(13))
      EDATE =MDATE(SHP(15),SHP(16),SHP(17))
C      CHECK IF SHIP IS BERTH DURING ANY OF THE SIMULATION DATES
      DO 80 I=1,ND
      IDATEC=0
      IF(IDATE(I).LT.SDATE) GO TO 80
      IF(EDATE.EQ.0) GO TO 65
      IF(IDATE(I).GT.EDATE) GO TO 80
      IF(IDATE(I).LT.ODATE) IDATEC=1
   65 IF(IDATE(I).GT.UDATE) IDATEC=1
      IF(IDATEC.EQ.0) GO TO 10
      SHPC(I)=SHPC(I)+1
      N=SHPC(I)
      IF(SHP(18).EQ.IBLNK)       GO TO 91
      DO 92 II =1,NBRS
      IF(SHP(18).NE.PIER(II,1)) GO TO 92
      SHPASG(I,N,4)=II
      GO TO 91
   92 CONTINUE
   91 SHPASG(I,N,5) =IBIP(SHP(1),SHP(2),IOCL)
      IF(SHPASG(I,N,5).NE.0) GO TO 98
      SHPC(I)=SHPC(I)-1
      GO TO 10
   98 SHPASG( I,N,1)=SHP(1)
      SHPASG(I,N,2)=SHP(2)
      ITEMP= IBIP(SHP(1),SHP(2),IOCL)
      SHPASG(I,N,6) = IOCL
      SHPASG(I,N,7)=SHP(22)
      SHPASG(I,N,8)=SHP(20)
      NCL=SHPASG(I,N,5)
   80 CONTINUE
      GO TO 10
C     THE FOLLOWING DETERMINES WHICH UNSCHEDULED SHIPS ARE PRESENT.
  100 DO 200 I = 1,ND
      IYR = IDATE(I)/365
      DO 210 K = 1,10
      IF (IYR.EQ.YEAR(K)) GO TO 220
  210 CONTINUE
      WRITE (6,211) IYR
  211 FORMAT (37H THERE ARE NO PROBABILITY DATA FOR 19,I2)
      GO TO 200
C     SHUFFLE THE ORDER OF THE PROBABILITY CARDS.
  220 DO 221 N = 1,JP
  221 SHUF(N) = RANF(DUM)
      SHUF(40) = 1.1
      FMIN = 0.
      DO 223 N = 1,JP
      L = 40
```

```
      DO 222 N = 1,JP
  222 IF (SMUF(N).LT.SMUF(L).AND.SMUF(N).GT.FMIN) L = N
      ISMUF(M) = L
  223 FMIN = SMUF(L)
C     SELECT UP TO MXSMP UNSCHEDULED SHIPS.
      IJP = 0
      DO 230 N = 1,JP
      L = ISMUF(N)
      IF (PROB(L,K).LT.RANF(DUM)) GO TO 230
      SMPC(I) = SMPC(I) + 1
      M = SMPC(I)
      SMPASG(I,M,1) = SHIP(L)
      SMPASG(I,M,2) = SNO(L)
      SMPASG(I,M,5) = IBIP(SHIP(L),SNO(L),IDCL)
      SMPASG(I,M,6) = ICCL
      SMPASG(I,M,8) = A8
      IJP = IJP + 1
      IF (IJP.GE.MXSMP) GO TO 280
  230 CONTINUE
  280 CONTINUE
C
C     WRITE MODIFIED SHIP RECORDS
C
        WRITE(6,2884) NY1,NY2,(VERSN(KL),KL=1,3),YARD
 2884 FORMAT(1H1,6HS8-12-2I1,5X,3A4,80X,A5)
      WRITE(6,2802)
       DO 126 I=1,NSCL
       SMPCLS(I,12)=ICLASS(SMPCLS(I,1),JALL)
       IF(MOD(I,50).NE.0) GO TO 120
       WRITE(6,2884) NY1,NY2,(VERSN(L),L=1,3),YARD
       WRITE(6,2802)
 2802 FORMAT(///5X,20HSHIP IDENTIFICATION  / 5X,19(1H-)// 7X,
     F              10HSHIP      ,25X,23HSHIP REQUIREMENTS TABLE /
     F                  5X,8HBERTHING,2X,8HBERTHING /
     F 7X,5HCLASS,5X,4HPROF,3X,4HTYPE,5X,4HHULL,4X,4HWEST,2X,
     F 4HEPWR,2X,4HSTMP,2X,4HFWTR,2X,4HSWTR,2X,5HCRANE,2X,5HLTSHP
     F,2X,5HUKCLS /
     F 7X,5H-----,5X,4H----,3X,4H----,2X,9H--------- ,5(2X,
     F 4H----),3(2X,5H-----))
  120 WRITE(6,2803) I,SMPCLS(I,12),(SMPCLS(I,J),J=1,11)
 2803 FORMAT(7X,I5,5X,I4,3X,A5,1X,I4,1X,I4,1X,I4,1X,5(I5,1X),1X,I5,2X,I5
     F ,2X,I5)
       RETURN
        END
```

```
      FUNCTION    IBIP(ISHP,ITYPE,IDKCLS)
C-----------------------------------------------------------------------
C
C     THIS FUNCTION DETERMINES THE SHIP BERTHING CLASS, AND
C     ITS DOCK CLASS GIVEN THE SHIPS TYPE AND HULL NO.
C
C-----------------------------------------------------------------------
      COMMON
     C /SHIPC/ SHPCLS(180,12),NSCL
      INTEGER SHPCLS
      N=0
      IDKCLS=98
       DO 16 I=1,NSCL
      IF(SHPCLS(I,1).NE.ISHP) GO TO 10
      IF(ITYPE.LT.SHPCLS(I,2)) GO TO 10
      IF(ITYPE.GT.SHPCLS(I,3)) GO TO 16
      N=I
      IF(SHPCLS(I,11).LE.0) SHPCLS(I,11)=98
      IDKCLS=SHPCLS(I,11)
      GO TO 20
   10 CONTINUE
   20 IBIP=N
       IF(N.LQ.0) WRITE(6,1000) ISHP,ITYPE
 1000 FORMAT(1X,2H**,18X,
     F          A5,2X,I4,32H IS AN UNDEFINED SHIP CLASS/TYPE
        RETURN
       END
```

```
      SUBROUTINE SORTS
C-----------------------------------------------------------------------
C
C     THIS ROUTINE SORTS THE SHIP RECORDS ACCORDING TO ASCENDING
C     DOCK CLASSES.
C
C-----------------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),ND,IOPT,NY1,NY2
     C /SHIP/ SHPASG(10,40,10) ,JALL
      INTEGER SHPASG,TEMP(10)
      DO 10 I=1,10
      DO 40 L=1,40
      DO 20 J=L,40
      IF(SHPASG(I,J,1).EQ.0) GO TO 40
      IF(SHPASG(I,L,6).LE.SHPASG(I,J,6)) GO TO 20
      DO 30 K=1,10
      TEMP(K)=SHPASG(I,L,K)
      SHPASG(I,L,K)=SHPASG(I,J,K)
   30 SHPASG(I,J,K)=TEMP(K)
   20 CONTINUE
   40 CONTINUE
   10 CONTINUE
 3000 FORMAT(1H1,6H50-13-,2I1,5X,3A4,60X,A5//)
 2000 FORMAT(5X    ,15HSHIP ASSIGNMENT /5X,15H---------------- /
     F 7X,4HDATE,4X,4HSHIP,2X,4HTYPE,3X,4HNULL,          3X,
     F 6HSHPCLS,2X,5HDKCLS,2X,5HPRITY,2X,4HTYNK /
     F 5X,8H-------- ,2X,4H----,          3X,4H----,2X,4H---- ,
     F 3X,6H------,2X,5H-----,2X,5H-----,2X,4H---- )
        LINE=0
        DO 81 I=1,ND
      CALL DAZE(IDATE(I),IM,ID,IY)
      DO 82 M=1,40
      IF(SHPASG(I,M,1).EQ.0) GO TO 81
      IF(MOD(LINE,50).NE.0) GO TO 84
      WRITE(6,3000) NY1,NY2,(VERSN(L),L=1,3),YARD
      WRITE(6,2000)
   84 WRITE(6,2001) IM,ID,IY,M,(SHPASG(I,M,JJ),JJ=1,2),
     W (SHPASG(I,M,KK),KK=5,8)
      LINE=LINE+1
 2001 FORMAT(5X,I2,1H/,I2,1H/,I2,2X,I4,2X,A5,2X,I4,      3X,
     F I6,2X,I5,2X,I5,2X,A4)
   82 CONTINUE
   81 CONTINUE
      RETURN
      END
```

```
      FUNCTION ICLASS(NAME,JALL)
C-----------------------------------------------------------------------
C
C     THIS FUNCTION  DETERMINES THE BERTHING PREFERENCE GROUP NO.
C     AND THE  BERTHING PREFERENCE GROUP NO. WHICH APPLIES TO ALL
C     SHIP TYPES
C
C-----------------------------------------------------------------------
      COMMON /CLASP/ ICLASP(10,15)
      DATA IALL/$HALL   /
      ICLASS=0
      DO 10 I=1,10
      DO 20 J=1,15
      IF(NAME.NE.ICLASP(I,J)) GO TO 20
       ICLASS=I
   20 CONTINUE
      IF(ICLASP(I,1).EQ.IALL) JALL=I
   10 CONTINUE
      IF(ICLASS.EQ.0) ICLASS=JALL
       RETURN
       END
```

```
      FUNCTION NDATE(M,I,J)
C-----------------------------------------------------------------------
C
C     THIS FUNCTION CONVERTS MONTH ,DAYS AND YEAR TO DAYS.
C
C-----------------------------------------------------------------------
      DIMENSION ICF(12)
      DATA ICF/0,1,-1,0,0,1,1,2,3,3,4,4/
      NDATE=30*(M-1)+ICF(M)+I+365*J
      RETURN
      END
```

TRACE

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```
      OVERLAY(OURFA,2,0)
      PROGRAM BAS2
      CALL ASSGN
       CALL SUMPY
5     END
```

SUBROUTINE SORT TRACE

```
      SUBROUTINE SORT(I)
C-----------------------------------------------------------------------
C
C     THIS ROUTINE SORTS THE SHIP RECORDS ACCORDING TO BERTH
C     PRE-ASSIGNMENT .
C     SHIPS BERTH ARE PLACED AT THE BEGINNING OF SHIP RECORDS.
C
C-----------------------------------------------------------------------
      COMMON
     C /SHIP/ SHPASG(10,40,10) ,JALL
      INTEGER SHPASG,TEMP(10)
      DO 40 L=1,40
      DO 20 J=L,40
      IF(SHPASG(I,J,1).EQ.0) GO TO 40
      IF(IABS(SHPASG(I,L,4)).GE.IABS(SHPASG(I,J,4))) GO TO 20
      DO 30 K=1,10
      TEMP(K)=SHPASG(I,L,K)
      SHPASG(I,L,K)=SHPASG(I,J,K)
   30 SHPASG(I,J,K)=TEMP(K)
   20 CONTINUE
   40 CONTINUE
      RETURN
      END
```

```
      FUNCTION INEST(ITYPE,INULL)
C-----------------------------------------------------------------------
C
C     THIS FUNCTION DETERMINES THE NESTING    INDEX NO. FOR A
C     GIVEN SHIP.
C
C-----------------------------------------------------------------------
      COMMON /NESTS/ NEST(100,15)   ,NESTC(100,5)
       INEST=0
      DO 10 I=1,100
      IF(NEST(I,1).LE.0) RETURN
      DO 20 J=1,15,3
      IF(ITYPE.NE.NEST(I,J)) GO TO 20
      IF(INULL.LT.NEST(I,J+1)) GO TO 20
      IF(INULL.GT.NEST(I,J+2)) GO TO 20
      INEST=I
      RETURN
   20 CONTINUE
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE ASSGN
C-----------------------------------------------------------------------
C
C     THIS ROUTINE ASSIGNS SHIPS TO APPROPRIATE BERTHS ACCORDING
C     TO THE CHOICE MATRIX AND BERTH GROUP PREFERENCE.
C
C-----------------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),ND,IOPT,NY1,NY2
     C /BERTHS/ BERTH(100,10)
     C /PIERS/ PIER(100,12),NBRS
     C /PIERC/ PIERCL(10,15)      ,NPCL
     C /SHIPC/ SHPCLS(100,12),NSCL
     C /SHIP/ SHPASG(10,40,10) ,JALL
     C /NESTS/ NEST(100,15)                ,NESTC(100,5)
      INTEGER SHPASG,SHPCLS,PIER,BERTH,PIERCL          ,PIERSV(100)
      DATA INULL/5HNULL  /           , PIERSV/100*0/
      REWIND 2
C
C       START SIMULATION
C       LARGEST SHIPS ARE CONSIDERED FIRST
C
      WRITE(2,4000) NY1,NY2,(VERSN(L),L=1,3),YARD
 4000 FORMAT(1H1,6H50-84-,2I1,5X,3A4,60X,A5)
      WRITE(2,2000)
 2000 FORMAT( // 54X,25HSHIP BERTHING AUDIT-TRAIL   //
     F 7X,4HDATE,4X,4HTYPE,2X,4HHULL,2X,4HPASS,2X,5HBERTH,30X,
     F 13HACTION TAKEN   //)
      DO 10 I=1,ND
      CALL SORT  (I)
      CALL DAZE(IDATE(I),IM,ID,IY)
 2001 FORMAT(54X,I2,1H/,I2,1H/,I2,2X,A5,1X,I4,2X,I4,2X,I5)
C
C       INITIALIZE FACILITIES AVAIL. AT BERTHS
C
      DO  26 K=1,NBRS
      PIERSV(K)=PIER(K,5)
       DO 22 LL=1,5
   22 NESTC(K,LL)=0
      DO 25 J=5,11
   25 BERTH(K,J-3)=PIER(K,J)
      BERTH(K,10)=0
      BERTH(K,1) =0
       KK = K+1
       IF(KK.GT.NBRS) GO TO 26
       DO 21 KK=KK,NBRS
        IF(PIER(K,1).NE.PIER(KK,1)) GO TO 28
       BERTH(K,2)=BERTH(K,2)+PIER(KK,5)
       BERTH(K,8)=BERTH(K,8)+PIER(KK,11)
        PIERSV(K)=BERTH(K,2)
   21 CONTINUE
   28 CONTINUE
   26  DO 24 K=1,NBRS
        IK=PIER(K,10)
        IF(IK.LE.0) GO TO 24
```

```
                IF(IK.LT.K) PIERSV(K)=PIERSV(IK)
               IF(IK.LT.K) GO TO 24
                PIERSV(K)=PIERSV(K)+PIERSV(IK)
            24 CONTINUE
   60          DO 29 K=1,NBRS
            29 PIER(K,2)=FLOAT(BERTH(K,2))/FLOAT(BERTH(K,8))+.5
          C      CONSIDER THE NO. OF PASSES TO BE MADE
               DO 30 J=1,3
               ISN=1
   65      C      CONSIDER A SHIP TO BE BERTH
           100 IF(SHPASG(I,ISN,3).GT.0) GO  TO 35
                INRT=0
               IF(INRT.GT.0) GO TO 81
                INRT=1
   70          WRITE(2,2001) IA,ID,IY,SHPASG(I,ISN,1),SHPASG(I,ISN,2)
          C      HAS SHIP BEEN ASSIGNED A BERTH
            81  NB= SHPASG(I,ISN,4)
                ISCL = SHPASG(I,ISN,5)
                IF(NB.NE.0)         GO TO 5001
   75           IF(SHPCLS(ISCL,12).EQ.JALL.AND.J.EQ.1) GO TO 35
            5001  IPCL= SHPCLS(ISCL,12)
               IF(NB.EQ.0) GO TO 71
          C
          C     CONSIDER IF THE SHIP CAN BE NESTED
   80     C
               N=0
                 IF(NB.GT.0) GO TO 83
                ISSN=SHPASG(I,ISN,9)
               ITYPE=SHPASG(I-1,ISSN,1)
   85          IHULL=SHPASG(I-1,ISSN,2)
               DO 76 II=1,48
               IF(SHPASG(I,II,1).NE.ITYPE) GO TO 76
               IF(SHPASG(I,II,2).NE.IHULL) GO TO 76
               NB=IABS(NB)
   90          NESTC(NB,II)=NESTC(NB,II)+1
               WRITE(2,2002) N,PIER(NB,1)
                WRITE(2,2006) ITYPE,IHULL
                GO TO 73
            76 CONTINUE
   95          NB=IABS(NB)
               SHPASG(I,ISN,4)=NB
               SHPASG(2,ISN,9)=0
               DO 77 JJ=1,48
                IF(SHPASG(I,ISN,1).NE.SHPASG(I-1,JJ,1)) GO TO 77
  100          IF(SHPASG(I,ISN,2).NE.SHPASG(I-1,JJ,2)) GO TO 77
               NP=JJ
            77 CONTINUE
               DO 78 JJ=1,48
               IF(SHPASG(I,JJ,9).NE.ISSN ) GO TO 78
  105           SHPASG(I,JJ,9)=NP
            78 CONTINUE
                WRITE(2,2002) N,PIER(NB,1)
               GO TO 78
            83   WRITE(2,2002) P,PIER(NB,1)
  110          GO TO 78
```

```
      C
      C       DETERMINE SHIP CLASS AND PIER CLASS
      C       BERTHS AVAIL. IN PIER CLASS
      C
  115    71 IF(J.EQ.3.AND.SMPCLS(ISCL,4) .LT.2) GO TO 35
            N1=1
            N2=15
            IF(J.GT.1) N2=NBRS
            DO 48 K=N1,N2
  120       IF(J.LT.2) GO TO 28
            IF(K.LQ.1) GO TO 27
            IF(PIER(K,1).EQ.PIER(K-1,1)) GO TO 48
         27 NB=K
         28 IF(J.EQ.1) NB=PIERCL(IPCL,K)
  125       IF(NB.LE.0) GO TO 48
            IF(PIER(NB,1).EQ.INULL) GO TO 48
            WRITE(2,2882) J,PIER(NB,1)
       2882 FORMAT(27X,I4,2X,A5)
      C
  130 C       DETERMINE NESTING ABILITY OF THE SHIP AND BERTH
      C
         82 IF(J.NE.3) GO TO 600
            IF(SMPCLS(ISCL,4).LT.2) GO TO 35
            IF(BERTH(NB,10).EQ.0) GO TO 600
  135       JSN=ISN-1
            KSN=0
            DO 500 II=1,JSN
            IF(SMPASG(I,II,4).NE.NB) GO TO 500
            IF(SMPASG(I,II,4).GT.0) KSN=KSN+1
  140       NP=II
        550 IF(INEST(SMPASG(I,NP,1),SMPASG(I,NP,2)).EQ.INEST(SMPASG(I,ISN,1),
           C SMPASG(I,ISN,2)) .AND.INEST(SMPASG(I,NP,1),SMPASG(I,NP,2)).NE.
           C 0) GO TO 72
            IF(SMPASG(I,ISN,1).NE.SMPASG(I,NP,1)) GO TO 560
  145       IF(SMPASG(I,ISN,5).NE.SMPASG(I,NP,5)) GO TO 500
         72 ISC1=SMPASG(I,NP,5)
            IF(SMPCLS(ISC1,4).EQ.0) GO TO 500
            IPON = PIER(NB,2)*SMPCLS(ISCL,10)
             IF(IPON.LT.SMPCLS(ISCL,5)) GO TO 5555
  150       IF(BERTH(NB,2).GE.SMPCLS(ISCL,5)) GO TO 502
       5555 IPON=(FLOAT(PIERSV(NB))/FLOAT(BERTH(NB,8)))*FLOAT(SMPCLS(
           C ISCL,10)))+.5
            IPON=IABS(IPON)
            IF(IPON.LT.SMPCLS(ISCL,5)) GO TO 500
  155       IF(PIERSV(NB).LT.SMPCLS(ISCL,5)) GO TO 500
        502 JPON=BERTH(NB,2)-SMPCLS(ISCL,5)
            BERTH(NB,2)=BERTH(NB,2)-SMPCLS(ISCL,5)
             IK=PIER(NB,10)
             IF(IK.LE.0) GO TO 501
  160        PIERSV(IK)=PIERSV(IK)-SMPCLS(ISCL,5)
            IF(BERTH(NB,2).GE.0) GO TO 501
            BERTH(NB,2)=0
             BERTH(IK,2)=BERTH(IK,2)+JPON
        501 PIERSV(NB)=PIERSV(NB)-SMPCLS(ISCL,5)
  165       NSH=SMPCLS(ISC1,4)-1
```

```
                    IF(NESTC(NB,KSN).GE.NSM) GO TO 500
                   NESTC(NB,KSN)=NESTC(NB,KSN)+1
                   SMPASG(I,ISN,4)=-NB
                   SMPASG(I,ISN,9) =NP
170                WRITE(2,2006) SMPASG(I,NP,1),SMPASG(I,NP,2)
 2006 FORMAT(50X,15HNEST SHIP WITH  ,A5,1X,I4)
                   GO TO 73
  500 CONTINUE
                   IF(SMPASG(I,ISN,4).EQ.0) GO TO 3005
175   600 CONTINUE
C
C        DETERMINE IF BERTH HAS SUFFICIENT FACILITIES
C
                   IF(SMPCLS(ISCL,12).NE.1) GO TO 5060
                  IF(BERTH(NB,8).EQ.1000) BERTH(NB,8)=1100
180    5000 IF(BERTH(NB,8).GT.0) GO TO 5002
                  IF(BERTH(NB,8).LT.0.AND.SMPASG(I,ISN,6).GE.45) GO TO 5002
                   GO TO 3002
       5002  IF(IABS(BERTH(NB,8)).LT.SMPCLS(ISCL,14)) GO TO 3002
185                 IPOW= PIER(NB,2)*SMPCLS(ISCL,10)
                    IF(IPOW.LT.SMPCLS(ISCL,9)) GO TO 6666
                   IF(BERTH(NB,2).GE.SMPCLS(ISCL,9)) GO TO 4005
       6666 IPOW=(FLOAT(PIERSV(NB))/FLOAT(BERTH(NB,8))*FLOAT(SMPCLS(
           C ISCL,10)))+.5
190                 IPOW=IABS(IPOW)
                    IF(IPOW.LT.SMPCLS(ISCL,5)) GO TO 3003
                  IF(PIERSV(NB).LT.SMPCLS(ISCL,5)) GO TO 3003
                    GO TO 4005
C
C        BERTH HAS FACILITIES TO HANDLE SHIP
C
       4005  SMPASG(I,ISN,4)=NB
C
C        DECREASE BERTH FACILITIES AVAIL.
C      WRITE ACTION TAKEN IN PROCESSING SHIP
C
                    GO TO 78
       3000 WRITE(2,2004)
       2004 FORMAT(50X,13HBERTH IS FULL    )
                    GO TO 40
       3001 WRITE(2,2005)
       2005 FORMAT(50X,41HSHIP CANNOT BE NESTED,IMPROPER SHIP TYPE          )
                    GO TO 40
       3002 IF(PIER(NB,1).EQ.INULL) GO TO 40
                     ID=IABS(BERTH(NB,8))
                    WRITE(2,2007) ID,SMPCLS(ISCL,10)
                    IF(BERTH(NB,8).LT.0) WRITE(2,2014)
       2014 FORMAT(50X,20HBERTH NOT ACCESSIBLE   )
       2007 FORMAT(50X 30HSHIP CANNOT BERTH,INSUFFICIENT SPACE
           F 6HAVAIL= ,I6,5H REQ= ,I6 )
                     GO TO 40
       3003 WRITE(2,2008) PIERSV(NB),SMPCLS(ISCL,9)
       2008 FORMAT(50X,30HSHIP CANNOT BERTH,INSUFFIENT POWER.
           F 6HAVAIL=  ,I6,5H REQ= ,I6)
                      SMPASG(I,ISN,3)=SMPASG(I,ISN,3)-1
```

```
                IF(PIERSV(NB).GE.SHPCLS(ISCL,5)) WRITE(2,2012)
             2012 FORMAT(50X,38HPOWER IS NOT ACCESSIBLE TO ENTIRE SHIP  )
                GO TO 40
             3005 WRITE(2,2013)
225          2013 FORMAT(50X,22HSHIP CANNOT BE NESTED          )
               40 CONTINUE
               70  IF(SHPASG(I,ISN,4).EQ.0) GO TO 35
                   IF(SHPASG(I,ISN,4).LT.0) GO TO 79
                   IF(SHPASG(I,ISN,3).GT.6) GO TO 35
230                IF(BERTH(NB,8).GT.0) BERTH(NB,8)=BERTH(NB,8)-SHPCLS(ISCL,10)
                  IF(BERTH(NB,8).LT.0.AND.IABS(BERTH(NB,8)).GE.SHPCLS(ISCL,10))
                 C BERTH(NB,8)=-(IABS(BERTH(NB,8))-SHPCLS(ISCL,10))
               79 NB=IABS(NB)
                   BERTH(NB,2)=BERTH(NB,2)-SHPCLS(ISCL,5)
235                 PIERSV(NB)=PIERSV(NB)-SHPCLS(ISCL,5)
                  JK = PIER(NB,10)
                    IF(JK.LE.0) GO TO 4006
                    PIERSV(JK)=PIERSV(JK)-SHPCLS(ISCL,5)
                   IF(BERTH(NB,2).GE.0) GO TO 4006
240                BERTH(JK,2) = BERTH(JK,2) + BERTH(NB,2)
                   BERTH(NB,2) = 0
             4006  IF (SHPCLS(ISCL,12).NE.1) GO TO 73
                     IK=PIER(NB,9)
                     IF(IK.LE.0) GO TO 73
245                IF(BERTH(IK,8).GT.0) BERTH(IK,8)=-BERTH(IK,8)
               73 IF(SHPASG(I,ISN,3).GT.0) GO TO 35
                   SHPASG(I,ISN,3)=2
                   IB= IABS(BERTH(NB,8))
                   WRITE(2,2009) IB,PIERSV(NB)
250          2009 FORMAT(50X,15HSHIP CAN BERTH,  ,
                F 16HREMAINING SPACE= ,I6,7H POWER= ,I6)
             C
             C       INCREMENT NO. OF SHIPS IN BERTH
                  BERTH(NB,10)=BERTH(NB,10)+1
255               WRITE(2,2010) BERTH(NB,10)
             2010 FORMAT(50X,21HNO.OF SHIPS IN BERTH=  ,I4)
             C
             C       CHECK TO SEE IF SHIP IS BERTH IN THENEXT SIMULATION TIME
               60 ITEST=IDATE(I)+60
260               IF(IDATE(I+1).GT.ITEST) GO TC 35
                  DO 90 II=1,40
                     IF(SHPASG(I+1,II,1).EQ.0) GO TO 35
                   IF(SHPASG(I+1,II,1).NE.SHPASG(I,ISN,1)) GO TO 90
                   IF(SHPASG(I+1,II,2).NE.SHPASG(I,ISN,2)) GO TO 90
265                SHPASG(I+1,II,4)=SHPASG(I,ISN,4)
                    SHPASG(I+1,II,9)=SHPASG(I,ISN,9)
                   WRITE(2,2011)
             2011 FORMAT(50X,46HSHIP REMAINS IN BERTH FOR NEXT SIMULATICN TIME  )
               90 CONTINUE
270            35 ISN=ISN+1
                   IF(SHPASG(I,ISN,1).NE.0) GO TO 100
               30 CONTINUE
               10 CONTINUE
                   ENDFILE 2
275                 RETURN
```

```
      END
```

```
      SUBROUTINE SUMMY
C-----------------------------------------------------------------------
C
C     THIS ROUTINE PRINTS TWO SUMMARIES  OF SIMULATION RESULTS.
C     1. FACILITIES AVAILABLE,REQUIRED AND THEIR DIFFERENCES
C     2. DETAILED SHIP ASSIGNMENT.
C
C-----------------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),ND,IOPT,NY1,NY2
     C /POWER/ IPWR(10,10),NPS
     C /SHIP/ SHPASG(10,40,10) ,JALL
     C /PIERS/ PIER(100,12),NBRS
     C /SHIPC/ SHPCLS(100,12),NSCL
      INTEGER SHPASG,SHPCLS,PIER,AVAIL(5),REQ(6),DIFF(5),TOTAL(3,6)
     I ,UREQ(6)         ,SP(10)
      DATA INULL,IAST,IBLK/ 5HNULL ,1H*,1H  /   ,IRO/3HRO  /
       DO 10 I=1,ND
      LINE=7
      CALL DAZE(IDATE(I),IM,ID,IY)
      WRITE(6,4000) NY1,NY2,(VERSN(L),L=1,3),YARD
 4000 FORMAT(1H1,6H50-01-,2I1,5X,3A4,80X,A5)
       WRITE(6,2000)    IM,ID,IY
C
C     INITIALIZE TOTALS AND REQ. ARRAYS.
C
       DO 16 J=1,10
   16 SP(J)=0
      DO 15 K=1,3
      DO 15 J=1,6
      UREQ(J)=0
   15 TOTAL(K,J)=0
      DO 20 J=1,NBRS
       IF(PIER(J,1).EQ.INULL) GO TO 20
      IF(J.GT.1.AND.PIER(J,1).EQ.PIER(J-1,1)) GO TO 20
C
C     INITIALIZE AVAIL. FCAILITIES.
C
   36 DO 35 L=1,6
   35 REQ(L)=0
      DO 36 L=1,5
   36  DIFF(L)=0
      AVAIL(1)=PIER(J,5)
      AVAIL(2)=PIER(J,7)
      AVAIL(3)=PIER(J,8)
      AVAIL(4)=PIER(J,6)
      AVAIL(5)=PIER(J,11)
      KK=J+1
       JSAVE=0
      DO 40 JJ=KK,NBRS
      IF(PIER(J,1).NE.PIER(JJ,1)) GO TO 45
      AVAIL(1)=AVAIL(1)+PIER(JJ,5)
      AVAIL(2)=AVAIL(2)+PIER(JJ,7)
      AVAIL(3)=AVAIL(3)+PIER(JJ,8)
     AVAIL(4)=AVAIL(4)+PIER(JJ,6)
```

```
                    JSAVE=JSAVE+1
                 40 AVAIL(5)=AVAIL(5)+PIER(JJ,11)
                C
                C     SUM  UNBERTH SHIP REQUIEMENTS.
     60         C
                 45 DO 50 L=1,48
                    IF(SHPASG(I,L,1).EQ.0) GO TO 50
                    IF(SHPASG(I,L,4).NE.0) GO TO 51
                     IF(SHPASG(I,L,10).EQ.1) GO TO 50
     65              SHPASG(I,L,10)=1
                     ISCL=SHPASG(I,L,5)
                     UREQ(1)=UREQ(1)+SHPCLS(ISCL,5)
                     UREQ(2)=UREQ(2)+SHPCLS(ISCL,7)
                     UREQ(3)=UREQ(3)+SHPCLS(ISCL,8)
     70                UREQ(4)=UREQ(4)+SHPCLS(ISCL,6)
                     UREQ(5)=UREQ(5)+SHPCLS(ISCL,10)
                      GO TO 50
                 51 IF(IABS(SHPASG(I,L,4)).NE.J) GO TO 50
                     ISCL=SHPASG(I,L,5)
     75              DO 53 I1=1,NPS
                      DO 54 I2=1,9
                      IF(J.NE.IPWR(I1,I2)) GO TO 54
                     SP(I1)=SP(I1)+SHPCLS(ISCL,5)
                 54 CONTINUE
     80          53 CONTINUE
                C
                C     SUM  BERTH SHIPS REQUIREMENTS
                C
                     REQ(1)=REQ(1)+SHPCLS(ISCL,5)
     85              REQ(2)=REQ(2)+SHPCLS(ISCL,7)
                     REQ(3)=REQ(3)+SHPCLS(ISCL,8)
                     REQ(4)=REQ(4)+SHPCLS(ISCL,6)
                     IF(SHPASG(I,L,4).LT.0) GO TO 52
                     REQ(5)=REQ(5)+SHPCLS(ISCL,10)
     90              GO TO 50
                 52 REQ(6)=REQ(6)+SHPCLS(ISCL,10)
                 50 CONTINUE
                C
                C
     95         C     DETERMINES DIFFERENCES
                C
                     DO 55 L=1,5
                 55 DIFF(L)=AVAIL(L)-REQ(L)
                C
    100         C     DETERMINE TOTALS
                C
                     DO 60 L=1,5
                     TOTAL(1,L)=TOTAL(1,L)+AVAIL(L)
                     TOTAL(2,L)=TOTAL(2,L)+REQ(L)
    105              TOTAL(3,L)=TOTAL(3,L)+DIFF(L)
                 60  TOTAL(2,6)=TOTAL (2,6)+REQ(6)
                C
                C     PRINT SUMMARY I.
                C
    110              IF(JSAVE.EQ.0) GO TO 115
```

```
                LL=J+JSAVE
                WRITE(6,2021) PIER(J,1),PIER(J,12),PIER(LL,12)
                 GO TO 120
            115 WRITE(6,2020) PIER(J,1),PIER(J,12)
115         120 WRITE(6,2001) (AVAIL(L),L=1,5)
                WRITE(6,2002) (REQ(L),L=1,6)
                WRITE(6,2003)  (DIFF(L),L=1,5)
                 LINE=LINE+4
                 IF(MOD(LINE,48).NE.0) GO TO 20
120             WRITE(6,4000) NY1,NY2,(VERSN(KL),KL=1,3),YARD
                 WRITE(6,2000) IM,ID,IY
             20 CONTINUE
                UREQ(3)=FLOAT(UREQ(3))/1440.+.5
                 WRITE(6,2012) (UREQ(L),L=1,6)
125             WRITE(6,2004) (TOTAL(1,L),L=1,5)
                WRITE(6,2005) (TOTAL(2,L),L=1,6)
                WRITE(6,2006) (TOTAL(3,L),L=1,5)
            2000 FORMAT(// 50X,19HBERTHING SUMMARY I. //
               F 5X,16HSIMULATION DATE ,I2,1H/,I2,1H/,I2,//5X,5HBERTH,
130            F 3X,8HSHIPYARD,8X,
               F 6HEPOWER,5X,6HFWATER,5X,6HSWATER,5X,5HSTEAM,6X,6HLENGTH,
               F 5X,6HNESTED /
               F 5X,6HLETTER,2X,8HIDENTITY,7X,8HAMP/450V,6X,3HGPM,8X,3HGPM,
               F 6X,6HLBS/HR,7X,2HFT,9X,2HFT/
135            F 5X,6H------,2X,8H--------,7X,8H--------,8X,8H------,5X,
               F 6H------,5X,7H-------,4X,6H------,5X,8H------ )
            2001 FORMAT(21X,5HAVAIL,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6)
            2002 FORMAT(21X,5HREQD ,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6,5X,I6)
            2012 FORMAT(//5X,1HU,15X,5HREQD ,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6,5X,I6)
140         2003 FORMAT(21X,5HDIFF ,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6,5X,I6)
            2004 FORMAT(//5X,5HTOTAL,11X,5HAVAIL,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6)
            2005 FORMAT(21X,5HREQD ,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6,5X,I6)
            2006 FORMAT(21X,5HDIFF ,2X,I8,4X,I6,5X,I6,5X,I7,4X,I6)
            2020 FORMAT(5X,A6,2X,A8)
145         2021 FORMAT(5X,A6,2X,A3,1H-,A3)
                 ICL=0
               C
               C     DETERMINE SHIPS BERTH
               C
150             DO 80 J=1,48
                IF(SHPASG(I,J,4).EQ.0)   GO TO 80
                 IF(ICL.NE.0) GO TO 101
               C
               C     PRINT SUMMARY II.
155            C
             4002 FORMAT(1H1,6H5U-02-,2I1,5X,3A4,80X,A5)
                 WRITE(6,2009)
             2009 FORMAT(//56X,26HBERTHING SUMMARY II.//5X,12HSHIPS BERTH  //
                F                                    5X,4HTYPE,3X,4HHULL,3X,
168             F 4HTYNK,3X,5HBERTH/ 5X,3(4H----,3X),5H----- )
              101  ICL=1
                NB=IABS(SHPASG(I,J,4))
                MARK=IBLK
               C
165            C     DETERMINE SHIPS NESTED
```

```
      C
            IF(SHPASG(I,J,4).LT.0) MARK=IAST
            IF(J.EQ.1) GO TO 85
            IF(IABS(SHPASG(I,J,4)).NE.IABS(SHPASG(I,J-1,4))) GO TO 85
            WRITE(6,2011) SHPASG(I,J,1),SHPASG(I,J,2),SHPASG(I,J,8),MARK
 170   2011 FORMAT(5X,A5,2X,I4,3X,A4,8X,A1)
            GO TO 90
        85  WRITE(6,2010) SHPASG(I,J,1),SHPASG(I,J,2),SHPASG(I,J,8),
           W PIER(N8,1)      ,MARK
 175   2010 FORMAT(5X,A5,2X,I4,3X,A4,3X,A5,A1)
        90 CONTINUE
            WRITE(6,4001)
       4001 FORMAT(///88X,16H(* SHIP NESTED ) )
            ICL=0
 180   C
       C     DETERMINE SHIPS NOT BERTH
       C
            DO 78 I=1,48
            IF(SHP*JG(I,J,1).LE.0) GO TO 78
             IF(SHPASG(I,J,4).NE.0) GO TO 78
 185        IF(ICL.NE.0) GO TO 75
            ICL=1
            WRITE(6,2007)
       2007 FORMAT(//5X,35HREQUIREMENTS FOR SHIPS NOT BERTHED
           F,19X,10HREASON FOR FAILURE /5X,
 190       F 4HTYPE,2X,4HHULL,2X,4HTYNK/5X,3(4H----,2X))
          75   IF(SHPASG(I,J,3).GE.0) WRITE(6,3089) SHPASG(I,J,1),
           W SHPASG(I,J,2),SHPASG(I,J,8)
            IF(SHPASG(I,J,3).LT.0) WRITE(6,3087) SHPASG(I,J,1)
 195       W,SHPASG(I,J,2),SHPASG(I,J,8)
       3087 FORMAT(5X,A5,1X,I4,2X,A4 ,33X,18HINSUFFICIENT POWER     )
       3089 FORMAT(5X,A5,1X,I4,2X,A4,33X,18HINSUFFICIENT SPACE      )
          78 CONTINUE
            WRITE(6,4002) NV1,NV2,(VERSN(L),L=1,3),YARD
 200        WRITE(6,2111)
            DO 2112 J=1,NPS
       2112 WRITE(6,2113) J,SP(J),IPWR(J,18)
       2111 FORMAT(5X,13HPOWER STATION,5X,4HREQD,5X,5HAVAIL/
           F 5X,13H------------ ,5X,4H----,5X,5H-----)
 205   2113 FORMAT(15X,I3,4X,I5,9X,I5)
          10 CONTINUE
            RETURN
            END
```

```
      TRACE                                CDC 6600 FTN V3.0-P291 OPT=1  06/28/72  13.11.24.      PAGE      1

OVERLAY(BURFA,3,8)
 PROGRAM BAS3
CALL GRAPH
END
```

```
      SUBROUTINE GRAPH
C-----------------------------------------------------------------------
C
C     THIS ROUTINE  GIVES A GRAPHIC PICTURE OF THE SHIPS POSITIONED
C     IN ASSIGNED BERTH.
C
C-----------------------------------------------------------------------
      COMMON
     C /TIME/ VERSN(3),YARD,IDATE(10),ND,IOPT,NV1,NV2
     C /SHIP/ SHPASG(10,40,10),JALL
     C /SHIPC/ SHPCLS(100,12),NSCL
     C /PIERS/ PIER(100,12),NBRS
      INTEGER SHPASG,SHPCLS,PIER,XLINE(3,115),BERL,BER(7),BERS(7,10)
     I,SAVE(38)
      DATA IAST,IBLNK,IX,IDOT,IPLUS,ICOM,INULL/1H*,1H ,1HX,1H.,1H+,
     G 1H,,9HNULL   /
      DO 15  K=1,ND
C
C     INITIALIZE ARRAYS
C
      DO 16 L=1,7
      BER(L)=0
      DO 16 LL=1,10
   16 BERS(L,LL)=0
      ISAVE=0
      LINE=0
      CALL DAZE(IDATE(K),IM,ID,IY)
      WRITE(6,1000) NV1,NV2,(VERSN(L),L=1,3),YARD ,IM,ID,IY
 1000 FORMAT(1H1,6H90-03-,2I1,5X,3A4,88X,A9/
     F                                          98X,38HBERTHING ASSIGNMENT SI
     MULATION /98X,6(5H-----)/1X,19HBERTH  SHIPYARD/
     F1X,19HLETTER IDENTITY,19X,23HSHIP UTILIZATION  CHART  ,4X,
     F 17HSIMULATION DATE  ,I2,1H/,I2,1H/,I2/
     F 1X,6H------,1X,8H--------,19X,4(5H-----),3H---,4X,5(5H-----))
      IBERC=1
C
C     CONSIDER  EACH BERTH
C
      NBS=NBRS+1
      DO 18 I=1,NBS
      IF(PIER(I,1).EQ.INULL) GO TO 18
      IF(I.EQ.1) GO TO 38
      IF(PIER(I,1).NE.PIER(I-1,1)) GO TO 20
      BERL=BERL+PIER(I,11)
      JSAVE=JSAVE+1
      IF(I.NE.NBS) GO TO 18
   20 IF(JSAVE.EQ.0) GO TO 21
      KBER=ISAVE+JSAVE
      WRITE(6,1001) PIER(ISAVE,1),PIER(ISAVE,12),PIER(KBER,12)
 1001 FORMAT(1X,A9,2X,A3,1H-,A3)
      GO TO 22
   21 WRITE(6,1002) PIER(ISAVE,1),PIER(ISAVE,12)
 1002 FORMAT(1X,A9,2X,A3)
C
C     INITIALIZE  GRAPH ARRAYS
```

```
      C
   22 DO 25 L=1,3
        DO 35 LL=2,114
   35 XLINE(L,LL)=IBLNK
        DO 45 LL=10,110,10
   45 XLINE(L,LL)=IDOT
        XLINE(L,1)=IDOT
        XLINE(L,115)=IDOT
   25 CONTINUE
        DO 26  L=1,10
   26 BERS(IBERC,L)=0
        DO 58 L=1,40
   58 SMPASG(K,L,10)=0
      C     DETERMINE NESTED SHIPS
      C
          DO 40 L=1,40
         IF(SMPASG(K,L,1).EQ.0) GO TO 40
         IF(SMPASG(K,L,4).GT.0) GO TO 40
          IF(IABS(SMPASG(K,L,4)).NE.ISAVE) GO TO 40
          ISN= SMPASG(K,L,9)
         SMPASG(K,ISN,9)=ISN
          IF(SMPASG(K,ISN,4).LT.0) GO TO 42
         SMPASG(K,ISN,4)=-SMPASG(K,ISN,4)
         SMPASG(K,ISN,10)=SMPASG(K,ISN,10)+1
   42    SMPASG(K,ISN,10)=SMPASG(K,ISN,10)+1
   40 CONTINUE
      C
      C     CONSIDER SINGLE SHIP
      C
         BERL=FLOAT(BERL)/20.+.5
          MARK=1
         DO 51 L=1,40
         IF(SMPASG(K,L,1).EQ.0) GO TO 51
         IF(SMPASG(K,L,4).LT.0) GO TO 55
         IF(SMPASG(K,L,4).NE.ISAVE) GO TO 51
         BERS(IBERC,JBERC)=    L
         JBERC=JBERC+1
         ISCL=SMPASG(K,L,5)
         LTSHP=FLOAT(SHPCLS(ISCL,13))/20.+.5
         MARK2=LTSHP
           LIMIT=MARK2+MARK-2
         DO 60 LL=MARK,LIMIT
   60 XLINE(3,LL)=IAST
          MARK=LIMIT+2
          GO TO 51
      C
      C     CONSIDER  NESTED SHIPS
      C
   55 IF(IABS(SMPASG(K,L,4)).NE.ISAVE) GO TO 51
         ISN=SMPASG(K,L,9)
          IF(ISN.NE.L) GO TO 51
          IF(SMPASG(K,ISN,10).EQ.0) GO TO 51
         BERS(IBERC,JBERC)=  L
         JBERC=JBERC+1
```

```
                ISCL=SHPASG(K,ISN,5)
                LTSHP=FLOAT(SHPCLS(ISCL,18))/20.+.5
                LIMIT=MARK+LTSHP-2
                 DO 61 LL=MARK,LIMIT
115          61 XLINE(3,LL)=IAST
                SHPASG(K,ISN,18)=SHPASG(K,ISN,18)-1
                MARK1=MARK
                MARK=LIMIT+2
                JCNT=0
120             DO 65 LL=L,48
                IF(SHPASG(K,LL,9).NE.ISN) GO TO 65
                IF(LL.EQ.ISN) GO TO 65
                IF(SHPASG(K,ISN,18).EQ.0) GO TO 65
               ISCL=SHPASG(K,LL,5)
125             BERS(IBERC,JBERC)= LL
                JBERC=JBERC+1
                 LTSHP=FLOAT(SHPCLS(ISCL,18))/20.+.5
                LIMIT= MARK1+LTSHP-2
                JCNT=JCNT+1
130             LCNT=3-JCNT
                DO 70 KK=MARK1,LIMIT
             70 XLINE(LCNT,KK)=IAST
                SHPASG(K,ISN,18)=SHPASG(K,ISN,18)-1
             65 CONTINUE
135          51 CONTINUE
             54  DO 52 KK=MARK,BERL
             52 XLINE(3,KK)=IX
          C
          C     PRINT GRAPH
140       C
                WRITE(6,1883) ((XLINE(KK,II),II=1,115),KK=1,3)
               LINE=LINE+1
          1883 FORMAT(16X,20A1,20A1,20A1,20A1,20A1,  15A1)
                IF(LINE.EQ.7) GO TO 41
145             IF(I.EQ.NBS) GO TO 41
                IBERC=IBERC+1
                GO TO 38
             41   WRITE(6,1884)
          1884 FORMAT(16X,115(1H-)/15X,2H20,8X,3H260,7X,3H460,7X, 3H600,7X,3H800,
150          F 6X,4H1000,6X,4H1200,6X,4H1400,6X,4H1600,6X,4H1800,6X,4H2000,6X,
             F 4H2206,6X/
             F 60X,21HBERTH LENGTH IN FEET /
             F 116X,1H*/99X,32H(X=OPEN,*=1 SHIP,*=NESTED SHIPS)  )
                WRITE(6,1885)
155       1885 FORMAT(33X,24HBERTH ASSIGNMENT LISTING/33X,24(1H-))
          C
          C     DETERMINE SHIPS IN EACH BERTH GRAPHED
          C     LIST SHIPS ACCORDING TO BERTH
          C
160             DO 186 LL=1,LINE
                DO 185 JJ=1,30
             185 SAVE(JJ)=0
                NC=0
                NBER=BER(LL)
165             IF(BERS(LL,1).EQ.0) GO TO 188
```

```
                      DO 110 KK=1,10
                      IF(KK.NE.1) GO TO 120
                      WRITE(6,1006) PIER(NBER,1)
                 1006 FORMAT(1X,A5,27X)
170                120 MPUN=IBLNK
                      IF(BERS(LL,KK+1).EQ.0) GO TO 130
                      ISN=BERS(LL,KK)
                      JSN=BERS(LL,KK+1)
                      IF(ISN.LE.0.OR.JSN.LE.0) GO TO 110
175                   MPUN=ICON
                      IF(SHPASG(K,ISN,4).LT.0.AND.SHPASG(K,JSN,4).LT.0) MPUN=IPLUS
                  130 ISN=BERS(LL,KK)
                      SAVE(NC+1)=SHPASG(K,ISN,1)
                      SAVE(NC+2)=SHPASG(K,ISN,2)
180                   SAVE(NC+3)=MPUN
                       NC=NC+3
                       IF(BERS(LL,KK+1).EQ.0) GO TO 115
                  110 CONTINUE
                  115 WRITE(6,1007) (SAVE(JJ),JJ=1,NC)
185               1007 FORMAT(33X, 7(A5,1X,I4,A1)          )
                       IF(NBER.EQ.NBS) GO TO 10
                  100 CONTINUE
                       LINE=0
                        IF(I.EQ.NBS) GO TO 10
190                    WRITE(6,1000) NY1,NY2,(VERSN(L),L=1,3),YAND ,IM,ID,IY
                       IBERC=1
                       DO 31 MM=1,7
                    31 BER(MM)   =0
                    30 ISAVE=1
195                    JBERC=1
                       BER(IBERC)=I
                        JSAVE=0
                       BERL=PIER(I,11)
                    10 CONTINUE
200                 15 CONTINUE
                       RETURN
                        END
```

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13. ABSTRACT

The Berthing and Utilities Requirements Forecasting (BURF) Program is a management tool designed to determine the berthing requirements for the naval shipyards over a long-range period. The berthing utilities considered by the program are linear space (ft), electric current (ac at 450 volts), fresh and salt water (gpm), and steam power (lb/hr). Given the ships to be berthed in a shipyard for any one day, the system will assign selected ships to berths and forecast the resulting utilities requirements at that yard for that day. By choosing appropriate peak days over the long-range period, an overall forecast for a yard can be produced.

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